



AGRICULTURAL RESEARCH INSTITUTE

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THE BRITISH PHARMACEUTICAL CONFERENCE.

AN ORGANIZATION FOR THE ENCOURAGEMENT OF PHARMACEUTICAL RESEARCH AND THE PROMOTION OF FRIENDLY INTERCOURSE AMONGST PHARMACISTS

ANNUAL MEETINGS OF MEMBERS

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1863, NEWCASTLE 1864, BATH 1865, BIRMINGHAM 1866 NOTTINGHAM 1867 DUNDEE 1868 NORWICH 1869, GLETER 1870, LIVERPOOL
1871, EDINBURGH 1872, BRIGHTON 1873, BRADFORD 1874 LONDON 1875 BELSTOW 1876, GLASGOW 1877, PLYMOUTH.
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1886, NEWCASTLE 1887, NEWCASTLE 1888, NEWCASTLE 1889, NEWCASTLE 1890, LONDON 1891, CARDIFF 1892, EDINBURGH.

The chief business of the meeting is the consideration of articles for publication and includes discussions on such

1863-4, 1864-5, H DEANE FLS 1865, 6, 1866, 7 PROF BENJELLY M R C S 1867-8 1868-9 D HANBURY, F R S,
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The Conference annually presents to members a book containing the proceedings of the year's work, and a report on the progress of pharmacy and pharmacy education in the United States. The book is published by the American Association of Colleges of Pharmacy, and is available to members of the Association at a special price. The book is published in the form of a yearbook, and contains a large amount of material of interest to the pharmacist. The book is published in the form of a yearbook, and contains a large amount of material of interest to the pharmacist.

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Gentlemen desiring to join the Conference can be nominated at any time on application to a Secretary or any other Officer or member. The Name and Address of each candidate should be written legibly, and forwarded to The A-S-SOCIETY, British Pharmaceutical Conference 17, Bloomsbury Square, London, W.C. together with the subscription.

THE ANNUAL SUBSCRIPTION

The Conference year commences on July 1st, and Annual Subscriptions are due in advance on that date. The amount, which includes free delivery of the Year Book, is 7s 6d for members residing within the Postal Union, and 8s 6d for those outside it. Remittances may be made by Postal or Post Office Order, or by Cheque, and should be crossed "The 1st Secy. H. B. P. M. Conf., 17, Bloomsbury Square, London, W.C." To all members immediately past the Annual Subscription, the Year Book, including Transactions, is posted as soon as published in November, and to all new subscribers on receipt of the Subscription. Extra copies of the Year-Book and Transactions for 1870 and subsequent issues, will be sent to members on receipt of Subscription above, for each additional copy. To non members, the price is Ten Shillings per volume, exclusive of postage. CRYSTAL PALACE, LONDON.

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COMPRISING

ABSTRACTS OF PAPERS

RELATING TO

PHARMACY, MATERIA MEDICA, AND CHEMISTRY

CONTRIBUTED TO BRITISH AND FOREIGN JOURNALS,

FROM JULY 1, 1891, TO JUNE 30,

1895.

WITH THE

TRANSACTIONS

OF THE

BRITISH PHARMACEUTICAL
CONFERENCE

AT THE

THIRTY-SECOND ANNUAL MEETING

HELD AT

BOURNEMOUTH,

JULY, 1895.

LONDON:

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MDCCCXCV.

YEAR-BOOK OF PHARMACY AND TRANSACTIONS

OF THE

British Pharmaceutical Conference.

1894-95.

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THE BRITISH PHARMACEUTICAL CONFERENCE.

AN ORGANIZATION ESTABLISHED IN 1863 FOR THE ENCOURAGEMENT OF PHARMACEUTICAL RESEARCH, AND THE PROMOTION OF FRIENDLY INTERCOURSE AND UNION AMONGST PHARMACISTS.

THE most important ways in which a member can aid the objects of the Conference are by suggesting subjects for investigation, working upon subjects suggested by himself or by others, contributing information tending to throw light on questions relating to adulterations and impurities, or collecting and forwarding specimens whose examination would afford similar information. Personal attendance at the yearly gatherings, or the mere payment of the annual subscription, will also greatly strengthen the hands of the executive.

A list of subjects suggested for research is sent to members early in the year. Resulting papers are read at the annual meeting of the members; but new facts that are discovered during an investigation may be at once published by an author at a meeting of a scientific society, or in a scientific journal, or in any other way he may desire; in that case, he is expected to send a short report on the subject to the Conference.

The annual meetings are usually held in the provinces, at the time and place of the visit of the British Association; that for 1896 will be held at Liverpool.

Gentlemen desiring to join the Conference can be nominated at any time on applying to the Secretary, or any other officer or member. The yearly subscription is payable in advance, on July 1st. The amount, which includes free delivery of the Year-Book, is 7s. 6d. for members residing within the Postal Union. Further information may be obtained from

THE ASST. SECRETARY; BRIT. PHARM. CONF.,
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THE YEAR-BOOK OF PHARMACY.

The Conference annually presents to members a volume of about 600 pages, containing the proceedings at the yearly meeting, and an Annual Report on the Progress of Pharmacy, or Year-Book, which includes notices of all pharmaceutical papers, new processes, preparations, and formulæ published throughout the world. The necessary fund for accomplishing this object consists solely of the subscriptions of members. The Executive Committee, therefore, call on every pharmacist—principal, assistant, or pupil—to offer his name for election, and on every member to make an effort to obtain more members. The price of the Year-Book to non-members is ten shillings. The constitution and rules of the Conference, and a convenient form of nomination, will be found at page 251.

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ERRATUM.

Page 24, line 13, *after* bisulphide *add* with mercury.

INTRODUCTION.

IN selecting a number of the leading contents of the present volume for a brief review in this preface, we refer, in the first place, to the discovery of argon, a new constituent of the atmosphere, as one of the most interesting contributions to recent scientific literature. The reader is aware that this discovery is the outcome of a series of investigations carried out by Lord Rayleigh and Prof. W. Ramsay, beginning with the observation that nitrogen isolated from the air is invariably heavier than the same element obtained from chemical sources, and that the extent of this difference, though small, is the same in every instance. Their researches have now fully established the fact that the greater weight of atmospheric nitrogen is due to the presence of a hitherto unknown gas possessing characters quite distinct from those of the other constituents of the air. The liquefaction and solidification of argon has been accomplished by K. Olszewski, who has now also succeeded in liquefying hydrogen, previously the sole remaining one of the gaseous elements once regarded as "permanent." Additional interest attaches to the study of argon from the circumstance that a subsequent search for this body made by W. Ramsay among the gases confined in a number of minerals, though unsuccessful in its immediate object, has led to the detection and isolation of helium, an element hitherto known only as a constituent of the solar photosphere. The remarkably low density of this gas may account for its non-existence in the terrestrial atmosphere; and its occurrence in minerals, which is confirmed by several other investigators, remains for the present unexplained. The spectroscopic characters of both argon and helium are described by W. Crookes. Before quitting the subject of new elements, or supposed elements, it may be mentioned that indications have been obtained by J. K. Bayer of the presence of another new member of this class of bodies in the liquors containing the bye-products left after the extraction of aluminium from red bauxite.

The presence of hydrogen peroxide in the air, which had recently been called in question by Ilosva, is re-asserted by E. Schöne, who, at the same time, rejects the supposition that the reactions upon which his opinion is based are due to nitrogen peroxide. He regards it as probable, however, that, in addition to hydrogen peroxide, organic peroxides formed by plants in the presence of sunlight may occur in the atmosphere. The existence of ozone in the air, likewise doubted by Ilosva, is re-affirmed by J. Peyrou; but as the latter appears to have chiefly relied on indications obtained with iodized starch paper, the supposition is admissible that the results ascribed by him to ozone may be due to peroxide of hydrogen.

The question whether nitrogen trioxide does or does not exist in the gaseous state is discussed by G. Lunge and G. Porschnew, who arrive at the conclusion that though this oxide as obtained at -21°C . in the form of a blue liquid is a definite chemical compound, it is decomposed into nitric oxide and nitrogen peroxide as soon as it is allowed to evaporate. In a report on the iodides and chlorides of nitrogen, T. Selivanoff shows that the reaction between ammonia and iodine in the presence of water begins with the formation of ammonium iodide and hypoiodous acid, and that the subsequent action of ammonia on this acid in varying proportions may lead to the formation of three different nitrogen iodides. An analogous view is taken by him of the chlorides of nitrogen and their formation. F. A. Gooch and D. A. Kreider describe a convenient laboratory process for obtaining at any time a steady current of chlorine by means of a Kipp apparatus, in which small successive quantities of hot hydrochloric acid are allowed to act on pieces of fused potassium chlorate. The resulting gas may be purified, if necessary, by passing it through a hot solution of manganous chloride in hydrochloric acid. H. Arctowski has compared the various methods in use for the purification of carbon bisulphide, and gives preference to the one consisting in the deodorization of the commercial product by agitation with mercury and the subsequent slow distillation of the decanted liquid. Carbon monosulphide is reported upon by A. Deninger, a carbon boride by H. Moissan, and two new chlorides of carbon by V. Meyer.

W. Harris and V. Meyer have investigated the action of heat on calomel, and infer from their results that this substance cannot be volatilized without decomposition, and that its so-called vapour is a mixture of mercuric chloride and mercury. The correctness

of this view, however, is disputed by M. Fileti, who adheres to his previous statement that no dissociation occurs during the volatilization of this preparation, and that its vapour density is in accord with the formula Hg Cl . The product of the action of sulphuretted hydrogen on mercurous salts, which was formerly regarded as mercurous sulphide and subsequently shown to consist of a mixture of mercuric sulphide and mercury, has been further studied by U. Antony and Q. Sestini, whose results indicate the conditions under which a definite chemical compound of the formula Hg_2S may be obtained. The conversion of black mercuric sulphide into the red modification forms the subject of a paper by W. Spring. E. J. Bartlett and W. H. Merrill point out that copper obtained from finely powdered cupric oxide by reduction with hydrogen, and likewise the so-called copper sponge, does not consist of the pure metal, but of a compound of copper and hydrogen of the formula Cu H_2 . A combination of cupric bromide with hydrobromic acid, described by P. Sabatier, is of interest on account of its yielding a purple solution of such intensity as to serve as a most sensitive test for the detection of copper, surpassing even the ferrocyanide reaction in delicacy.

The often-discussed action of glycerin on borax in the presence of water is looked upon by L. F. Kebler as a catalytic one, comparable to that of sulphuric acid in the conversion of alcohol into ether. He regards borax as sodium tetraborate, which is decomposed in this action into free boric acid and sodium metaborate, while the glycerin is left as such. It appears to us, however, that in attributing to the boric acid thus liberated the acid character of the resulting liquid and its power of readily decomposing sodium carbonate with evolution of carbonic anhydride, he, in common with other investigators, fails to account for the fact that the acidity of this liquid is much more marked than that of an aqueous solution of free boric acid, and that such a solution does not possess the same power of decomposing carbonates. In our opinion, the precise nature of the reaction between glycerin and borax has not yet been fully explained.

E. Donath deals with the hydrolysing action of aqueous glycerin, and shows that cane sugar, milk sugar, maltose, etc., can be inverted by means of this agent in the same manner and the same order of facility as with dilute acids. He inclines to the supposition that the hydrates contained in an aqueous solution of glycerin undergo dissociation at elevated temperatures, and that the hydrolysis is effected by the nascent molecules of water. The

results of experiments by G. H. Morris on the hydrolysis of maltose by yeast confirm Fischer's statements as to the action of air-dried yeast and its extract, and also of ruptured moist yeast; but they indicate the entire absence of any hydrolysis when the same yeast, free from ruptured cells, is used in the moist and well-drained condition without previous drying. The dry yeast is also found to possess the power of liquefying starch paste. The observation that blood-serum contains enzymes capable of converting starch, dextrin, and maltose into glucose, has induced F. Röhmann to continue his investigation in this direction; and he now reports that both maltase and glucase occur in this serum, as well as in pancreatic juice, intestinal juice, and saliva. Further information with regard to the action of diastase on starch is furnished by A. R. Ling and J. L. Baker, and likewise by H. T. Brown and G. H. Morris. Some additional papers have been published respecting the nature of blue iodide of starch, in one of which C. Lonnes supports the view expressed by Mylius that hydriodic acid is an essential constituent of this compound. The results of C. Meinecke, on the other hand, point to an exactly opposite conclusion. In the opinion of F. W. Küster this blue iodide is neither a chemical compound nor a mixture, but a well-defined, solid solution of iodine in starch.

The oxidation of cane sugar at an ordinary temperature by means of a moderate proportion of potassium permanganate is shown by T. L. Phipson to result in the formation of citric acid, while the same process conducted with an excess of permanganate leads to the production of oxalic acid. Milk sugar, too, seems to be capable, under certain conditions, of yielding citric acid, for the normal occurrence of an alkaline citrate in milk has recently been noticed by L. Vaudin, who supposes it to be formed in the mammary gland, and to serve the purpose of promoting the solubility of the calcium phosphate contained in the milk. At an elevated temperature, milk sugar, in the presence of alkaline salts and air, gives rise to the formation of coloured oxidation products to which P. Cazeneuve and M. Haddon attribute the yellow coloration of milk on exposure to heat. No fresh syntheses in the sugar-group appear to have been effected during the past year but the entire work done in this direction since 1891 is dealt with in a review published by E. Fischer. The same author, in conjunction with L. Beensch, gives a further report on crystalline artificial glucosides obtained by saturating solutions of glucose in different alcohols with hydrochloric acid gas.

The so-called hyoscine salts of commerce have been again examined by E. Schmidt, whose results supply additional proof that these preparations are in reality salts of scopolamine, associated with very small quantities of hyoscyamine and atropine. He has also extended his researches to henbane seeds, but here, too, he has failed to obtain any evidence of the existence of Ladenburg's hyoscine. Ulexine is once more proved by A. Partheil to be identical with cytisine, while the identity of sophorine and cytisine is established by P. C. Plugge. The same alkaloid (cytisine) is thus shown to occur in various species of *Cytisus*, in *Ulex europæus*, and in *Sophora tomentosa*, and its presence is also inferred in other poisonous species of *Sophora*. Two cactaceous alkaloids, extracted from species of *Anhalonium*, are described by A. Heffter, and the occurrence of another base, resembling strychnine in its toxic properties, in species of this and various other genera of the same natural order has been observed by L. Lewin. The latest contributions to the chemical history of aconitine by M. Freund and by W. R. Dunstan and F. H. Carr deal with questions of priority with regard to the establishment of the recently adopted view of the constitution of this base. A. Ladenburg has repeated the conversion of synthetical coniine into the dextro-rotatory base by treatment with dextro-rotatory tartaric acid, and, working upon larger quantities of material, he has been enabled to purify the product by three successive recrystallizations. He calls attention to differences in the specific gravity, boiling-point, and rotatory power between this and his previous product, which he attributes to the presence of isoconiine in the latter. R. Wolffenstein shows that commercial specimens of "pure" coniine may contain several other bases, and arrives at the conclusion that the variable and uncertain physiological action of this alkaloid may be due to the presence or absence in it of varying proportions of coniceine, the toxicity of which is much greater than that of coniine. Laudanidine, a new opium alkaloid, has been obtained by O. Hesse, and proves to be isomeric with laudanine. A comparison of these two alkaloids points to the probability that laudanine may consist of laudanidine and a dextro-rotatory base not yet isolated. The results of a study of the constitution of thebaine by M. Freund and E. Göbel favour the inference that this alkaloid is derived from a dihydrophenanthrene, while morphine and codeine may be regarded as tetrahydrophenanthrene derivatives. Further reports on morphine, codeine, narceine, as well as on caffeine, cocaine, brucine, hydrastine,

granatonine (pelletierine), nicotine, piperidine, and some of the cinchona alkaloids, which are referred to in this volume, are almost entirely confined to the consideration of compounds and derivatives of these bodies.

A. Béchal and E. Choay correct an error very largely prevailing respecting the composition of "official creosote," by showing that guaiacol, so far from being its predominating constituent, as is generally supposed, amounts to much less than either the monophenols or the creosol and its homologues contained in it. The average proportion of guaiacol in creosote from beechwood is stated to be 19·7, and that in oakwood creosote about 14 per cent. The creosote from both sources here referred to is understood to consist of the fractions boiling between 200° and 220° C. A number of terpenes and other constituents of essential oils have also been investigated during the past year, and have met with notices in this volume.

Some of the recent contributions to the chemistry of urine may be briefly alluded to in this preface. The variation in the colour of urate sediments is shown by A. E. Garrod to be due to the fact that the uroerythrin contained in them may be associated with varying quantities of other colouring matters, such as urochrome, hæmatoporphyrin, chrysophanic acid, and bile pigments. With regard to the source of uroerythrin, he considers that there is clinical, though as yet no chemical, evidence pointing to the liver as the probable seat of its formation. Hæmatoporphyrin is found by the same author to occur in small quantities in healthy urine as a normal constituent. The urine of a patient suffering from *angina pectoris* has yielded to A. B. Griffiths and C. Massey a crystalline, characteristic, highly toxic base not occurring in normal urine. The well-known reaction of albumin with potassium ferrocyanide and acetic acid serves as the basis of a quantitative process for the approximate estimation of this substance. Kreidl's method for the determination of uric acid by means of iodine in the presence of potassium hydrate is stated by E. Bryk to be fallacious, inasmuch as the reaction upon which it depends is not of a definite nature. Processes for the detection of peptone in urine, and for the estimation of iodine in the same liquid, are described by E. Salkowski and H. Sandlund respectively. Urine voided after the administration of sulphonal is observed by P. Lafon to act on Fehling's solution in a manner somewhat similar to saccharine urine, though the optical test may show the absence of glucose; and a like disturbing influence on

the copper test is known to be caused by the administration of several other therapeutic agents. Owing to circumstances of this kind, and more especially on account of the slight reducing action of perfectly normal urine, the application of alkaline cupric solutions and other equally well-known tests for the detection of glucose in urine, though safe enough if carried out with a full knowledge of the precautions required, still appears in many instances to lead to erroneous conclusions, notwithstanding all that has been said and written on the subject. Unfortunately, the testing of urine is too often performed by inexperienced workers; and as long as this is the case, fallacious diagnoses and their consequences as to treatment are inevitable. Attention is drawn to such errors and their sources in a paper by Sir G. Johnson, in which, among other interesting observations, it is shown that by far the greater part of the reducing action of normal urine on copper solutions is due to creatinine, and that after the removal of this constituent and of the uric acid by suitable treatment with mercuric chloride, etc., the filtrate is entirely devoid of this action. In the presence of glucose, however, the reducing power of the latter remains unimpaired after the elimination of the two substances named. It is therefore inferred that normal urine does not contain any appreciable trace of sugar, a conclusion which is further supported by other reactions. The detection of glucose by the picric acid test is also dealt with by this author, and directions are given by him for applying the reaction in such a manner as to ensure trustworthy results without the necessity of any previous removal of the creatinine. With regard to this substance, it is pointed out that "pure urinary creatinine," as obtained by cold fractional precipitation with mercuric chloride, is a base distinct from the creatinine hitherto described, and possessing much more active reducing properties. It is stated to be the only constituent of normal urine exerting any reducing action on an alkaline solution of picric acid. The gravimetric estimation of glucose is advocated by F. Gaud in preference to the usual volumetric process on the ground that the accuracy of the latter is somewhat impaired by the destructive action of the alkali on the sugar. M. Samelson, however, inclines to the opinion that the results of the volumetric method are quite satisfactory, provided that the copper solution employed is properly standardised for this purpose, instead of its correct strength being taken for granted. Further information is furnished by A. W. Gerrard respecting the cyano-cupric test for the determination of

glucose, which we consider to merit greater attention at the hands of analysts than it has hitherto received.

A solution of resorcin in strong hydrochloric acid is recommended by A. Conrady as a suitable reagent for the detection of cane sugar as an adulterant in sugar of milk. W. E. Stone has compared the chief methods in use for the determination of starch in feeding stuffs, etc., and gives preference to the one based on the action of diastase. A modification of this diastase process, stated to be both expeditious and accurate, is proposed by P. L. Hibbard. The estimation of starch in compressed yeast is effected by F. Filsinger by precipitating it as iodide of starch, washing the heavy precipitate by decantation, and freeing it from moisture and iodine by drying at 105° C. Of the numerous methods suggested at different times for the detection of methylated spirit in tinctures, A. Ashby regards the test with sodium nitroprusside in the presence of ammonia as the most satisfactory. Colour reactions of morphine, colchicine, and chelidonium, are described by G. Bruylants, E. Barillot, and J. A. Battandier. A process for the determination of aconitine, devised by J. C. Umney, is based on the decomposition of this alkaloid by complete hydrolysis into aconine and acetic and benzoic acids. In a report on the purity of tannic acid, G. Vulpius points out that even the best commercial samples of this preparation give indications of the presence of gallic acid. With reference to tannin estimations, it is shown by W. T. Wenzell that the hide powder usually employed in these processes may be advantageously replaced by American isinglass. L. Barthe proposes a volumetric method for the determination of salicylates, which depends on the fact that a solution of the sodium salt in dilute hydrochloric acid can be evaporated to dryness at 50° – 60° C. without any loss of salicylic acid by volatilization, and that this acid may therefore be titrated in the residue by means of standard alkali in presence of phenolphthaleïn. A new mode of estimating hydrochloric acid in gastric juice, suggested by J. J. Kasass, is based on the liberation by this acid of tartaric acid from potassium bitartrate suspended in alcohol. The comparative merits of litmus and methyl-orange as indicators are discussed both by B. Reinitzer and G. Lunge. The value of borax for standardising acids with the aid of methyl-orange is confirmed by E. P. Perman and W. John, who claim decided advantages for this preparation over the ordinary alkalies. F. Kratschmer and E. Wiener show that the proportion of carbonic anhydride in the air may be conveniently ascertained by titrating two equal volumes of a solution of sodium

hydrate with sulphuric acid and phenolphthaleïn, the one immediately, and the other after shaking with a known volume of air, and deducing the amount of carbonate formed from the difference in the result between the two titrations. Indole is recommended as a test for nitrites by O. Bujwid. For the detection of traces of chlorides in the presence of bromides, A. Villiers and M. Fayolle propose a modification of their aniline test, consisting in the application of a mixture of glacial acetic acid and saturated aqueous solutions of aniline and orthotoluene. A new and very sensitive test for potassium is introduced by J. van Eyk, who employs for this purpose a solution of nitrite of cobalt and sodium, which forms with potassium salts a yellow precipitate identical with that obtained in the well-known reaction of cobalt solutions with potassium nitrite. The various instances in which sodium peroxide may be usefully employed in chemical analysis are discussed by T. Poleck, and also by O. Kassner. The complete decomposition of arsenious sulphide by the prolonged action of a large quantity of boiling water serves as the foundation of a process for the determination of arsenic in copper described by F. Platten. For the same estimation, if the proportion of arsenic be exceedingly small, F. A. Gooch and H. P. Moseley compare the mirror obtained in Marsh's test with a series of standard arsenical mirrors. A modification suggested by G. C. Stone in the titration of zinc with potassium ferrocyanide is based on the application of a weak solution of cobalt nitrate as indicator. Improved methods of water analysis are published by A. Zega, I. A. Bachman, F. Hundeshagen, and A. Bomboletti, while a number of other investigators deal with processes for the analysis of articles of food and a variety of other substances.

B. H. Paul and A. J. Cownley have continued their researches on the chemistry of *ipêcacuanha*, and have now fully established the fact that this root contains several distinct alkaloids, and that the emetine of nearly all previous investigators is an indefinite mixture of these. They describe an amorphous base of the composition $C_{15}H_{29}NO_2$, and a crystallizable one of the formula $C_{14}H_{20}NO_2$, under the respective names of *emetine* and *cephaeline*. Both occur in *Carthagena* as well as in Brazilian *ipêcacuanha*, and are found to yield neutral salts which are more readily crystallizable from acid than from neutral solutions. Another crystallizable alkaloid, existing in the drug in very small proportion only, has also been isolated, and is still under investigation. The same authors are likewise studying the so-called *ipêcacuanhic acid*

described by Willigk, and have obtained indications that this body is probably not a definite chemical compound. The constituents of ipecacuanha are also under examination by R. A. Cripps, whose results have thus far been only published in an incomplete form. No confirmation has as yet been obtained of the presence in this drug of the volatile alkaloid referred to by Arndt. H. G. Greenish deals with the histology of ipecacuanha, and shows how the Brazilian and Carthagena drugs may be distinguished in the state of powder, and also how the root and stem may be recognised in the same condition. The importance of supplementing the chemical examination of samples of the powdered drug by a microscopic one is forcibly illustrated by the statement that out of thirty-two commercial specimens thus examined, only one proved to be the powder of really good Brazilian root free from stem. The structure of the rhizome of *Hydrastis canadensis* is described by J. Pohl, and the same valuable service is performed by E. S. Bastin with regard to the rhizomes and rootlets of *Podophyllum peltatum*, *Iris versicolor*, *Veratrum viride*, *Cimicifuga racemosa*, *Geranium maculatum*, *Heuchera americana*, *Sanguinaria canadensis*, *Asarum canadense*, and the root-bark of *Sassafras officinale*.

In a report on senega root, A. Schneegans confirms the occurrence therein of methylsalicylate as a normal constituent, and states that it also contains free salicylic acid. The same author, in conjunction with J. E. Gerock, corroborates the existence of gaultherin in the bark of *Betula lenta*; while an observation by M. P. Romburgh indicates the presence of the same glucoside, or of its decomposition product, methylsalicylate, in coca leaves. Analyses by L. E. Sayre of fresh taraxacum root and of the same root after drying at 50° C. show that the desiccation at this temperature causes no appreciable change in the nature and proportion of the main constituents. Elder root, a structural description of which is given by J. Moeller, has been stated to possess poisonous properties when fresh, but not after it has been dried; but no light has as yet been thrown on this subject by chemical research. Quite recently, G. de Sanctis claims to have isolated from the leaves and twigs of elder a very small quantity of an alkaloid identical in its physical and chemical characters with coniine. Evidently the chemistry of this plant stands in need of further elucidation. Pellitory root has yielded to W. R. Dunstan and H. Garnett a crystalline, intensely active substance, *pellitorine*, which in most of its chemical and physical properties

resembles *piperovatine*, an equally active principle recently extracted by the same authors from the leaves of a West Indian medicinal plant known as *Piper ovatum*. The root of *Corydalis cava* has been further investigated by J. J. Dobbie and A. Lauder, who supply additional information respecting its alkaloidal constituents. D. Hooper gives an account of a chemical and histological examination of the root of *Bragantia wallichii*, a plant growing on the western coast of India, and enjoying, like other members of the order *Aristolochiaceæ*, a local reputation as a remedy for snake bites. The root is found to contain appreciable quantities of an alkaloid. A description of the plant and a sketch of its botanical history are given in the same paper.

True coto bark from Bolivia has been re-investigated by O. Hesse, who reports that the cotoïn from this bark is identical with that obtained from other varieties, and that the same may be said with regard to paracotoïn. The substances known as dicotoïn and pseudodicotoïn, however, are now ascertained by him to be mixtures of cotoïn and bodies of the formula $C_{11}H_8O_2$ and $C_{11}H_8O_3$ respectively. The root bark of *Punica granatum*, when tested by Gehe's process of assay, is found by W. Stoeder to give an average yield of 1.0 per cent. of alkaloids, while the yield from the stem bark is considerably less. The accuracy of the process is confirmed. Quassia wood is shown by E. Merck to contain in addition to quassin a new constituent which is described under the name of *quassol*. Guaiacum wood is reported by A. Schneegans to contain a small proportion of vanillin; and the same constituent is observed by E. O. v. Lippmann to occur in the flowers of *Nigritella suaveolens*.

J. B. Nagelvoort has examined the leaves of cultivated specimens of *Scopolia carniolica* without being able to detect any trace of scopolamine in them. He is not prepared, however, to regard these negative results as a proof of the absence of this base in wild plants of the same species. Experiments with *Datura Stramonium*, published by A. R. L. Dohme, lead to the conclusion that the stems of this plant contain more alkaloid than the leaves, and that the plants gathered in June are poorer in alkaloid than those collected in July and August. Comparative assays of the leaflets and leaf stalks of jaborandi by M. Conroy prove that the alkaloid contained in the latter amounts to only one-half of that contained in the former. In Bolivian cusco leaves, C. T. Liebermann and G. Cybulski have detected the presence of a third liquid base, the composition of which is represented by the formula

$C_{13}H_{24}N_2O$. The occurrence of lobeline in *Lobelia purpurescens*, a plant having a reputation in New South Wales as an antidote to snake poison, is established by J. H. Maiden. A variety of *Carissa ovata* is shown by T. L. Bancroft to contain a crystalline bitter glucoside chemically distinct from ouabain, which it resembles in its physiological characters. The characteristic action of *Rhus toxicodendron* and *R. venenata* is attributed by F. Pfaff and S. S. Orr to the presence of a poisonous non-volatile oil very similar to, but not identical with, cardol; and a like constituent is reported by D. Hooper to exist in the fruit of *Holigarna ferruginea*. The flower heads of *Artemisia maritima* are found by E. Merck to contain a new constituent which may probably prove to be oxysantonin. The fruit of *Randia dumetorum*, an Indian remedy for dysentery, has been examined by M. Vogtherr, and is stated by him to contain a characteristic saponin, an acid principle, a tannin, and traces of an alkaloid. The results of an analysis of tea seed by D. Hooper also reveal the presence of a toxic saponin, as well as of notable quantities of albuminoids, carbohydrates and fatty oil, and lead to the suggestion that this seed should be tried as an insecticide and used as a manure in tea plantations. The quantitative composition of commercial varieties of cacao beans is dealt with by H. Beckurts and by W. E. Ridenour; and similar accounts with regard to varieties of kola nuts are given by C. Uffelmann and A. Bömer, as well as by C. O. Topping, who also confirms the presence in kola of a ferment capable of splitting up the glucoside kolanin into caffeine, glucose, and kola red. G. Baumert and K. Halpern have investigated the constituents of the seeds of *Chenopodium album*, but have not as yet succeeded in throwing light on the poisonous properties these seeds have been repeatedly observed to possess. The toxic action of nutmegs, which likewise has hitherto remained unexplained, is attributed by M. Daschewski to the essential oil contained in them. A good deal of uncertainty appears still to attach to the chemistry of ergot of rye, as may be seen from a recent statement by C. C. Keller to the effect that he has been unable to obtain more than one single alkaloid from this drug, and that this is identical in its properties with Tanret's ergotinine, Blumberg's picrosclerotine, and Kobert's cornutine. In connection with this subject, Gehe, however, expresses the opinion that the want of agreement in the chemical products obtained from ergot by various investigators is due to fundamental differences in the nature and composition

of the material operated upon, and also to the liability of some of its constituents to spontaneous changes.

An examination of the fruits of a cultivated specimen of *Strophanthus gratus*, hitherto known as *Roupellia grata*, has supplied M. Franchet with confirmatory evidence that this plant is the source of the smooth strophanthus seed of commerce. At the same time, he considers it very probable that some of this seed may be yielded by the closely allied species, *Strophanthus Tholloni*. In discussing the botanical sources of asafoetida, E. M. Holmes shows that *Ferula Jäschkeana* is not one of the plants yielding this gum resin. The same author also describes some medicinal products from the Straits Settlements, while M. Greshoff reports on a number of useful Indian plants, and H. Kraemer on the materia medica of Ceylon. Accounts of some poisonous plants of Australia and of Southern Africa are published by J. H. Maiden and J. M. Wood.

While alluding to recent contributions to the literature of materia medica we may also briefly refer to a number of instances of drug adulteration which have come under notice during the past year. A supply of senega has been observed to contain about 25 per cent. of the roots of *Triosteum perfoliatum*, which differ from the genuine drug in the absence of the characteristic keel and in the greater thickness of the rootlets. The occurrence of pokeroot (*Phytolacca decandra*) in a sample of belladonna root is mentioned by C. B. Lowe, and shown to be easily detected by the marked structural and other differences between the two drugs. A new false Angustura bark is described by J. Barclay; and the same chemist, in another paper, alludes to the very frequent sophistication of kamala. Attention is called by R. Pfister to the practice of improving the powder of lower grades of cinnamon bark by the admixture of cassia stalks, which possess a very powerful odour of cinnamon. F. Ranwez refers to the adulteration of saffron with crocus stamens, showing how readily their presence may be detected in the powdered drug by means of the microscope. A paper on cubebs and their adulterations, dealing with the history of the subject and the results of a microscopic research, is published by A. de Weyre. The leaves of *Empleurum serrulatum*, which have occasionally reached this country, either mixed with, or simultaneously with shipments of *Barosma serratifolia*, have been examined by J. C. Umney, who points out that though these leaves show certain botanical and chemical affinities with buchu, their use as a substitute for that drug is not per-

missible as long as their therapeutic value has not been determined by investigation. Extracts of the bark or wood of various species of *Terminalia* are spoken of by Gehe as adulterants frequently occurring in commercial cutch. Tests for the purity of Peruvian balsam, consisting in the estimation of the percentage of cinnamein and of the saponification equivalent, are suggested by the same author; and a spurious balsam of Tolu is reported upon by J. O. Braithwaite in a communication to the recent meeting of the British Pharmaceutical Conference. The detection of castor oil and of gurjon oil in copaiba is dealt with by L. Maupy and by T. D. Dodge and Olcott respectively; while further accounts of sophisticated oil of theobroma and fictitious beeswax are given by R. Pfister, L. F. Kebler, A. Kremel, and B. S. Proctor.

The necessarily limited space of this chapter prevents us from referring to numerous other vegetable drugs which have met with notices in this volume; and for the same reason we must forego individual allusions to the essential oils which have been investigated or re-investigated during the past year. We should not omit, however, to call the reader's attention to a report by J. C. Umney on the relation of these oils to the British Pharmacopœia and trade, in which valuable suggestions are made in the case of each one of these preparations with regard to their description, characters, and tests, so as to place the official requirements on a par with the present state of knowledge on this subject.

The physiological properties of manacin, a principle contained in manaca roots, have been studied by J. Brandl, who finds that this body exercises a marked stimulating action on the motor end plates and the secreting glands. The toxic effects of nicotine are observed by M. Parenty and J. Grasset to be much milder in its salts than in the free base; but the symptoms produced in both instances, though differing in intensity, appear to be otherwise the same. Physiological experiments with pyridine by T. L. Brunton and F. W. Tunnicliffe lead to the inference that this base, in comparison with its derivatives, is not an active poison, and that its action is chiefly confined to the sensory part of the nervous system. The introduction of an atom of chlorine into the molecule of caffeine is shown by J. W. Pickering to cause a considerable modification in the physiological action of this alkaloid; and striking differences in the nature of the action of various compounds of the cocaine series are pointed out by P. Ehrlich and A. Einhorn. Melanthin, which was isolated by Greenish from the seeds of *Nigella sativa*, is reported by W. v. Schulz to produce

effects identical with the action of the most toxic saponins. In discussing the therapeutic value of digitalis constituents, E. Merck, after referring to the various digitalins regarded as best adapted for medicinal use, draws attention to recent researches by Masius and Corin, who report most favourably on the very prompt and certain action of digitoxin, and on the comparative freedom of this principle from the drawback of producing gastric disturbance. G. Bardet, on the other hand, is inclined to regard crystallized digitalin as the only digitalis product possessing a definite, constant, and well-investigated therapeutic action. A new use for papain is advocated by M. Bartholow, in whose hands this substance has proved a very successful remedy for tapeworm.

The repeatedly asserted value of piperazine as a solvent of uric acid deposits and calculi is doubted by J. Fawcett on the ground that, though an aqueous solution of this remedy possesses the solvent power referred to, a solution of it in urine, such as may be eliminated after its internal administration, exercises no solvent action whatever on uric acid calculi. The therapeutic properties hitherto ascribed to this substance are now also claimed for lysidine, another artificial base exhibiting a powerful solvent action on uric acid. The relative value of ferratin and albuminate of iron as therapeutic agents is discussed by J. O. Schlotterbeck and S. R. Boyce, whose results do not establish any decided superiority of the former over the latter. A caseinate of iron is reported upon by L. Dawydow; and a new organic iron preparation is introduced under the name "carniferrin," and is stated to be a combination of this metal with phosphoric acid, a constituent of flesh. "Lactophenin" and "citrophene" may be here mentioned as further additions to the ever-increasing list of synthetic antipyretics, and "gallicin," a methyl-derivative of gallic acid, as an external remedy employed in the treatment of catarrhal affections of the eye. Cadmium salicylate is recommended for similar purposes, and strontium salicylate as an intestinal antiseptic. A combination of the sodium salts of salicylic and lactic acids is brought under the notice of the profession under the name of salactol; and both this compound and also toluol are reported to be most valuable remedies for diphtheria. The antidiphtheritic serum treatment appears to be rapidly rising in favour, and promises to mark an epoch in modern medical science. Already the principle underlying this new treatment is being applied in several other directions, as may be seen from reports on antitoxic serums for cancer, syphilis, and snake-poison.

New formulæ for standardised preparations of belladonna are suggested by R. A. Cripps, who advocates the use of a strong liquid spirituous extract of the root, containing 0.75 part of alkaloids in 100 fluid parts, as a basis for making the other preparations. A modification of the official formula for belladonna plaster is also proposed by P. Boa. F. C. J. Bird describes an improved process for the preparation of acetic extract of ipecacuanha, having for its object the prevention or considerable reduction of the loss of alkaloid involved in the method of the British Pharmacopœia. An examination of commercial specimens of B.P. tinctures by E. H. Farr and R. Wright reveals a deplorable want of uniformity in alkaloid strength and proportion of extractive in the case of nearly every one of these preparations, including even those which are directed to be made from standardised drugs. Samples of liquid extract and tincture of cinchona have been tested by H. Brown with a similar result. According to observations made by J. Barclay, no serious loss of extractive appears to take place in the storing of tinctures under ordinary conditions for a reasonable length of time. With regard to the preparation of tincture of cinchona, a mixture of glycerin and spirit is found by F. Davis to be a more suitable menstruum than spirit only. F. Liverseege points out that in the preparation of tincture of lobelia by the retail pharmacist it is impossible by means of a pestle and mortar to make the whole of the powdered drug pass through a fine sieve, and that the sifted portion yields a much stronger tincture than an equal weight of the particles of stalks left in the sieve. New suggestions for the recovery of alcohol from tincture mares are made by F. C. J. Bird. The comparative merits of various menstrua for the preparation of powdered extracts are discussed by C. S. N. Hallberg, who considers a mixture of three volumes of alcohol and one volume of chloroform as the most suitable in the majority of cases. Directions for the preparation of two distinct fluid extracts of *Grindelia robusta* are given by M. Jürgens. W. A. H. Naylor has investigated the cause of the sulphuretted odour sometimes emitted by the compound syrup of hypophosphites of the B.P.C., and has been able to trace this to the action of the hypophosphoric acid on sulphites present as impurities in the syrup. Processes for the assay of syrup of iodide of iron are described by E. Bourquelot and W. Kubel respectively. Finally we may add that reports on pill coatings, suppositories, and surgical dressings, as well as a number of practical notes and formulæ, will also be found in this volume.

CHEMISTRY.

YEAR-BOOK OF PHARMACY.

PART I.

CHEMISTRY.

Liquefaction of Hydrogen. Prof. Olszewski. (From a communication read before the University College [London] Chemical and Physical Society, March 15th, 1895.) The author announces the successful liquefaction of hydrogen, and gives its critical point, measured with a platinum resistance thermometer, as -233° C., and its boiling point as -243° at ordinary atmospheric pressure.

Argon: a New Constituent of the Atmosphere. Lord Rayleigh and Prof. W. Ramsay. (From a paper read before the Royal Society, January 31st, 1895.) The observation made by one of the authors that nitrogen isolated from the air is about $\frac{1}{2}$ per cent. heavier than that obtained from other sources, led to a further investigation of the atmospheric gases under various conditions, which has eventually resulted in the discovery of a new gaseous element. On submitting a mixture of air and oxygen to the prolonged action of electric sparks, and absorbing the resulting nitrous fumes by potash, a residue was left which consisted neither of nitrogen nor oxygen, and showed a special line in the spectrum. Subsequently the same gas was obtained in larger quantities by first depriving air of its oxygen by repeatedly passing it over red-hot copper, then drying the issuing gas by means of soda-lime and phosphorus pentoxide, and finally absorbing the nitrogen by passing it through a combustion tube tightly packed with magnesium turnings and heated to redness in a furnace. The gas obtained by either process was found to be two and a half times more soluble in water than nitrogen, about

twenty times heavier than hydrogen, and to show no tendency to combine with other elements. Its molecule is considered by the authors to be identical with its atom, and its atomic weight (and likewise its molecular weight) to be about 40.

A description of the characteristic spectrum of argon by W. Crookes, and the announcement of the liquefaction and solidification of this element by K. Olszewski, form the concluding part of this interesting report.

M. Berthelot has subsequently announced that argon is capable of entering into chemical combination, since he has found that, under the influence of the silent electric discharge, it combines with benzene and other organic compounds.

Helium. Prof. W. Ramsay. (From a paper read before the Chemical Society, June 20th, 1895.) This element, which has hitherto been known only as a constituent of the sun, has now been detected by the author among the gases contained in a number of minerals. It was first observed by him in the gases obtainable from clèveite, and appeared to be associated therein with argon; but further research has proved the absence of argon and the existence of helium not only in this but also in a number of other minerals. Three methods were employed to obtain the gas from the minerals.

1. The mineral was enclosed in a tube of hard glass which was connected to a pump, the tube raised to the highest possible temperature, and the gas evolved pumped out and collected.

2. The mineral was fused with potassium bisulphate, and the gases collected as in method 1.

3. The mineral was boiled with sulphuric acid and water, and the whole conducted in a stream of carbon dioxide.

The gases obtained by one or other of these methods were passed through soda, then mixed with oxygen and submitted over mercury to the prolonged action of electric sparks. The resulting gas was again passed through soda, and the unabsorbed portion of it transferred to a vacuum tube and its spectrum examined. The helium spectrum is very characteristic and contains five bright lines: (1) brilliant red; (2) D_3 , the yellow helium line observed in the solar spectrum; (3) peacock blue; (4) blue; (5) violet. It is pointed out as curious that two lines in the red portion of the spectrum are identical with two of the lines in the spectrum of argon.

Helium is found to be the least soluble of all gases; it has a very low density, and is capable of combining with platinum.

Its non-existence in the air may be attributable to its low density, which would cause it to rise rapidly beyond the limits of the atmosphere. Its occurrence in minerals remains for the present unexplained.

The presence of helium in the gases contained in minerals is confirmed by Prof. Hodgkinson (*Chem. News*, lxxi. 248), who obtained it from euxenite and samarskite, and also by Prof. Clève. The identity of its spectrum with the solar element first called by this name is fully borne out by Crookes.

The molecule of helium, like that of argon, is supposed to be monatomic.

A Supposed New Element. J. K. Bayer. (*Bull. de la Soc. Chim.* [3], xi. 1155.) The author has received indications of a new element existing in the form of an acid compound in the liquors containing the bye-products left after the extraction of aluminium from red bauxite. The spectrum of the new body exhibits characteristic lines in the green, blue, and violet. A description of its chemical reactions is given in the paper.

Atmospheric Ozone. J. Peyron. (*Comptes Rendus*, cxix. 1206-1208.) In all the author's experiments, conducted between the beginning of July and the end of October, 1894, ozone has been constantly recognized in country air both day and night; while in Paris, even in the neighbourhood of trees, it was only recognizable during the prevalence of high winds in October.

Solubility of Ozone in Water. L'Abbé Mailfert. (*Comptes Rendus*, cxix. 951-953.) Ozone is distinctly soluble in water, and imparts its odour to the solution. The latter reduces silver oxide and forms hydrogen peroxide in contact with ether. The author has determined the extent of its solubility, which is greater than that of oxygen, and is the same in acidified water as in pure water, provided the temperature does not exceed 20° C.; while at higher temperatures the solubility is greater in acidified than in pure water. Tables showing the degree of solubility under varying conditions are given in the paper.

Hydrogen Peroxide in the Atmosphere. E. Schöne. (*Ber. der deutsch. chem. Ges.*, xxvii. 1233-1235.) In reply to Ilosva (*Year-Book of Pharmacy*, 1894, 21), the author objects to the statement that nitrogen peroxide is a constant constituent of air, and re-asserts the presence in the latter of hydrogen peroxide, and the trustworthiness of the reagents he employs for its detection, of which he has recently given experimental proof (*Zeitschr. für analyt. Chem.*, 1894, 137). He regards it as probable that, in

addition to hydrogen peroxide, organic peroxides formed by plants in the presence of sunlight may occur in the atmosphere.

Nitrogen Trioxide. G. Porschnew. (*Journ. Russ. Chem. Soc.*, xxv. 684, 685.) The results of the author's experiments confirm the conclusion that dry nitrogen trioxide has no existence in the gaseous state. The liquid trioxide splits up on evaporation into nitric oxide and nitrogen peroxide.

Nitrogen Trioxide. G. Lunge and G. Porschnew. (*Zeitschr. für anorg. Chem.*, 1894, vii. 209-250.) The authors have carried out a series of experiments for the purpose of settling the question of the existence or non-existence of nitrogen trioxide in the gaseous state, and have adopted every possible precaution to avoid erroneous conclusions. They find that the trioxide obtained at -21°C . as a blue liquid is a well-defined chemical compound, but that at ordinary temperatures it is decomposed, and that its decomposition into nitric oxide and nitrogen peroxide begins to set in, even under pressure, and whilst it is still in the liquid state. As a gas, therefore, nitrogen trioxide has no existence.

Preparation of Chlorine for Laboratory Purposes. F. A. Gooch and D. A. Kreider. (*Zeitschr. für anorg. Chem.*, vii. 17-21.) On heating hydrochloric acid of 1.1 specific gravity to about 80°C ., and slowly adding it at that temperature in small successive quantities to pieces of fused potassium chlorate in a Kipp apparatus surrounded by hot water, a steady current of chlorine is obtained containing about 15 per cent. of chlorine dioxide. Most of this impurity can be removed by passing the gas through a saturated hydrochloric acid solution of manganous chloride at about 90°C . 2 grams of the chlorate yield 1 litre of chlorine. By passing the purified gas through a red-hot combustion tube filled with asbestos, the last traces of dioxide can be eliminated, and an absolutely pure product obtained.

Carbon Vapour. H. Moissan. (*Comptes Rendus*, cxix. 776.) When carbon is vaporised it appears to change from the solid to the gaseous state without passing through the intermediate liquid form. The vapour condenses in the form of graphite. Liquefied carbon has not been obtained.

Hydrate of Carbonic Anhydride. P. Villard. (*Comptes Rendus*, cxix. 368-371.) The author arrives at the conclusion that the hydrate of carbonic anhydride discovered by Wroblewski has a composition represented by the formula $\text{C O}_2, 6 \text{ H}_2\text{O}$, corresponding to that of the nitrous oxide hydrate, to which compound

it is also analogous in its crystalline form and in the conditions of its formation and decomposition.

Action of Sulphuric Acid on Charcoal. J. Giraud. (*Bull. de la Soc. Chim.* [3], xi. 389-391.) When sulphurous anhydride is prepared from sulphuric acid and charcoal, a white crystalline sublimate is sometimes observed in the neck of the flask, especially towards the end of the process and in the presence of an excess of charcoal. From the author's examination it appears to be pyromellitic acid, and it is supposed to be preceded in its formation by mellitic acid as the first product. These bodies evidently result from the oxidation of hydrocarbon compounds present in the charcoal.

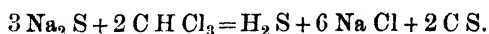
Carbon Chlorides. V. Meyer. (*Ber. der deutsch. chem. Ges.*, 1894, 3160.) The author describes the formation of compounds of the composition C_2Cl_4 and C_2Cl_6 at a temperature as low as 20° - 40° C., during the preparation of carbon tetrachloride by the chlorination of carbon bisulphide. During the re-distillation of the tetrachloride, an oily liquid, boiling at a higher temperature than the latter, is obtained; and this is found to contain the two compounds referred to, of which C_2Cl_4 is liquid, while C_2Cl_6 is solid. Their production is explained by the action of 4 and of 5 molecules of chlorine respectively on 2 molecules of carbon bisulphide, resulting in the formation of $2 S_2Cl_2$ in addition to the two carbon chlorides.

Carbon Boride. H. Moissan. (*Comptes Rendus*, cxviii. 556.) Carbon boride is obtained by heating 66 parts of amorphous boron with 12 parts of pure carbon (obtained from sugar) in an electric furnace. The resulting product is purified by repeated treatment with fuming nitric acid and potassium chlorate. It forms black lustrous crystals of 2.15 specific gravity, which are not attacked by iodine, bromine, phosphorous, or boiling mineral acids, but can be burned in oxygen at a very high temperature, yielding carbonic anhydride and a residue consisting of boric anhydride and some unchanged portion of carbon boride.

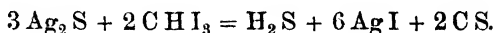
Aluminium Carbide. H. Moissan. (*Comptes Rendus*, cxix. 16.) The author has obtained a compound of the formula C_3Al_4 in the form of transparent, yellow crystals, possessing marked reducing properties. When this body is treated with water, the latter is slowly decomposed with evolution of methane (CH_4).

Carbon Monosulphide. Dr. Deninger. (*Pharm. Journ.*, 3rd series, xxv. 940.) This compound is obtained by heating anhy-

'drous sodium sulphide with excess of chloroform in sealed tubes at $180^{\circ}\text{C}.$:—



It is also evolved by heating a mixture of silver sulphide and iodoform :—



It is gaseous at ordinary temperatures, combustible, and freely soluble in alcohol. Ordinary freezing mixtures readily condense it to a clear, colourless liquid.

Carbon Bisulphide. H. Arctowski. (*Zeitschr. anorg. Chem.*, vi. 255-259.) Of the various methods of purification the author gives preference to that recommended by Sidot, which consists in shaking the bisulphide until the odour has nearly all disappeared, and slowly distilling the decanted liquid. Thus purified, it boils at $46.27^{\circ}\text{C}.$, and is practically free from odour, but it requires to be kept well protected from light, heat, air, and moisture, if its purity is to be retained.

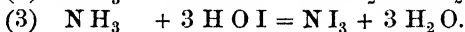
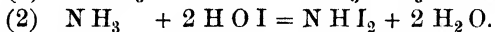
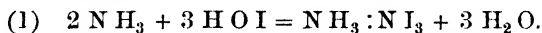
The author has studied the solvent action of carbon bisulphide on a large number of metallic salts, most of which he found to be insoluble. Mercuric chloride, bromide, and iodide proved to be slightly, and mercurous and ferric chlorides very slightly soluble, while mercurous nitrate and lead nitrate only yielded very small quantities to the solvent on boiling.

Combination of Sulphur with Iodine. C. E. Linebarger. (*Amer. Chem. Journ.*, 1895, 33-59.) The author considers that sulphur iodide of the formula S_2I_2 is the only definite chemical compound of these two elements which up to the present has been proved to exist, and that even this is but a feeble combination. He concludes that the atoms of iodine and sulphur have a greater tendency to form molecular aggregations than to combine with each other.

Specific Gravities of Solutions of Sulphuric Acid. H. D. Richmond. (*Chem. News*, lxi. 236.) The results of a careful re-determination of the specific gravities of mixtures of weighed quantities of sulphuric acid and water indicate the correctness of Pickering's table, which is at variance with the tabular results published by Lunge and Isler.

Iodides and Chlorides of Nitrogen. T. Selivanoff. (*Ber. der deutsch. chem. Ges.*, xxvii. 1012-1019.) The author considers that the reaction between ammonia and iodine in the presence of

water begins with the formation of ammonium iodide and hypiodous acid in accordance with the equation $\text{NH}_3 + \text{H}_2\text{O} + \text{I}_2 = \text{NH}_4\text{I} + \text{HOI}$, and that nitrogen iodide is subsequently formed by the action of ammonia on the hypiodous acid. According to the relative proportions of these two substances, three different iodides may be produced, the formation of which is explained by the following equations:—



The names *sesqui-iodylamide*, *di-iodylamide*, and *tri-iodylamide* are respectively suggested for these three compounds, which the author thus regards as amido-derivatives of hypiodous acid.

An analogous view is taken of the chlorides of nitrogen and their formation.

By reversing the above equations an explanation is afforded of the formation of hypiodous acid on dissolving nitrogen iodides in ammonia, and the same remark applies to the formation of hypochlorous acid from the chlorides of nitrogen.

Some of the characteristic reactions of iodide and chloride of nitrogen are discussed in this paper and viewed in the light of the foregoing conclusions.

The Yellow Modification of Arsenic. J. W. Retgers. (*Zeitschr. anorg. Chem.*, vi. 317–320.) Schuller obtained this modification by sublimation in a vacuum, and pointed out its instability and extreme volatile nature. The author now directs attention to the parallel series of modifications, consisting of the colourless (regular), the light-red, and the dark-red, hexagonal phosphorus on the one hand, and the yellow, the black (regular), and the silver-white, hexagonal arsenic on the other hand.

The Yellow Modification of Arsenic. H. McLeod. (*Chem. News*, 1894, lxx. 139.) This modification, first discovered by Schuller, has been obtained by the author by heating arsenic in a current of carbonic anhydride. His experiments confirm its tendency to revert spontaneously to the original state.

Arsenites. A. Stavenhagen. (*Journ. prakt. Chem.*, 1895 [2], 1–42.) The author has reinvestigated the arsenites of a large number of metals, and has succeeded in preparing a number of new salts, descriptions of which are given in his paper, which should be referred to for particulars. He has not been able to obtain a definite compound of arsenious anhydride with ferric hydrate, and

he considers it possible that the action of the latter as an antidote to the former in poisoning cases is due to the fact that it prevents the reduction of the arsenious oxide to arsine, to the formation of which, in the absence of the antidote, the fatal effects may chiefly be due.

Sulphohypophosphates. C. Friedel. (*Comptes Rendus*, cxxxi. 260.) The author has obtained a series of salts of an acid of the formula $H_4P_2S_6$, corresponding in its type to hypophosphoric acid. Iron, copper, aluminium, zinc, lead, silver, mercury, and tin salts of this acid are described.

Atomic Weight of Bismuth. R. Schneider. (*Journ. prakt. Chem.* [2], 1. 461-471.) The mean result of six determinations, in which large proportions of metal were converted into the oxide, shows the atomic weight of bismuth to be 208.05 (O = 16). The individual results varied between 207.84 and 208.15. The author's previous determinations gave 208.0, and those of Classen 208.9 as the atomic weight of this metal.

Re-Determination of the Atomic Weights of Nickel and Cobalt. C. Winkler. (*Zeitschr. anorg. Chem.*, viii. 1-11.) The method adopted by the author in these atomic weight determinations consists in depositing the metal by an electric current on a platinum electrode, dissolving it in an excess of iodine in potassium iodide, and then estimating the excess of iodine by sodium hypsulphite. The mean results obtained from the first series of five experiments were (1) Ni = 58.6878, Co = 59.3849; from the second series of three experiments, (2) Ni = 58.7433, Co = 59.3507. This gives, as the mean of all the observations, Ni = 58.7155, Co = 59.3678, taking H = 1 and I = 126.53. Full details of experiments are given.

Action of Heat on Calomel. W. Harris and V. Meyer. (*Ber. der deutsch. chem. Ges.*, xxvii. 1482-1489.) The authors describe a number of experiments, the results of which seem to indicate that calomel cannot be volatilized without decomposition, and that its so-called "vapour" is a mixture of mercuric chloride and mercury.

Action of Heat on Calomel. M. Fileti. (*Journ. prakt. Chem.* [2], 1. 222, 223.) Referring to the paper on this subject by W. Harris and V. Meyer (preceding abstract), the author claims to have shown in a previous report that no dissociation takes place during the volatilization of calomel. In proof of his opinion he repeats the observation that no deposit of mercury is formed on a cooled gold surface immersed in the vapour at 400° C.

Action of Heat on Calomel. V. Meyer. (*Ber. der deutsch. chem. Ges.*, 1894, xxvii. 3143-3145.) The author disputes the validity of Fileti's observation (preceding abstract) as evidence of the existence of mercurous chloride in a state of vapour, and points out that a cooled gold surface also fails to show the presence of metallic mercury in the mixed vapours of the metal and mercuric chloride. He adheres to the opinion expressed by him in conjunction with W. Harris (see above), that calomel does not exist as such in the state of vapour.

The Molecular Formula of Mercurous Chloride. M. Fileti. (*Journ. prakt. Chem.*, 1895 [2], 197-204.) The author again replies to the observations of V. Meyer, and criticises the experiments described by that chemist in conjunction with Harris. He adheres to his former statements with regard to the vapour of calomel, and has again satisfied himself that the vapour density of this salt is 8.14 (air = 1). The composition of its molecule is therefore correctly represented by the formula Hg Cl .

Conversion of Black Mercuric Sulphide into the Red Modification. W. Spring. (*Zeitschr. anorg. Chem.*, vii. 371-383.) The ordinary black mercuric sulphide cannot be converted into the red modification by pressure. By subliming it in the presence of a sufficient quantity of an inert gas, the author has obtained a new black modification of the sulphide in the form of a micro-crystalline powder, which can be readily converted into the red modification by a pressure of 100 atmospheres, or by treatment with yellow ammonium sulphide. The red sulphide, when heated at 250° - 320° , turns black, but regains its red colour on cooling. On heating it to 410° , however, it remains black on cooling.

Mercurous Sulphide. U. Antony and Q. Sestini. (*Gazzetta Chim. Ital.*, xxiv. i. 193-198. From *Journ. Chem. Soc.*) Mercurous sulphide, Hg_2S , was described by Sefström and by Brande, but their product was supposed by Guibourt and by Barfoed (*Jahresb.*, 1864, 282) to consist of a mixture of mercuric sulphide and mercury.

On passing a stream of hydrogen sulphide through potassium sulphate solution containing mercurous chloride or acetate in suspension, at -10° , a black powder consisting of mercuric sulphide and mercury is deposited. A mixture of dry hydrogen sulphide and carbonic anhydride, however, acts on pure, dry mercurous chloride at -10° with formation of mercurous sulphide; the carbonic anhydride is employed merely to dilute the hydrogen

chloride evolved. Mercurous sulphide is also obtained by the action of dry hydrogen sulphide on dry mercurous acetate at -10° , no gaseous diluent being necessary in this case; the salt is stable at -10° , but decomposes into mercuric sulphide and mercury if the temperature rises above 0° . Mercurous sulphide may be distinguished from the mixture of mercuric sulphide and mercury by its behaviour towards a mixture of dry hydrogen chloride and carbonic anhydride. On passing these gases over the mixture containing the mercuric salt, no action occurs at either low or ordinary temperatures. At -18° the gas has practically no action on mercurous sulphide; at -12° the salt is slowly converted into mercurous chloride, whilst at 0° the conversion proceeds rapidly. Above 0° the action becomes more sluggish as the temperature rises, until at $+18^{\circ}$ no mercurous chloride at all is produced; this is accounted for by the fact that the mercurous salt is completely decomposed into mercuric sulphide and mercury at this temperature.

Mercurous sulphide is a black powder which is not affected by the alkali hydroxides, ammonia, ammonium sulphide, or dilute nitric and hydrochloric acids below 0° ; fuming nitric acid, however, rapidly oxidises it. It readily dissolves in sodium or potassium sulphide below 0° , giving a limpid solution which, as the temperature rises, deposits mercury in a very fine state of subdivision.

Hydrides of Copper. E. J. Bartlett and W. H. Merrill. (*Amer. Chem. Journ.*, 1895, 185-189.) The reaction between copper sulphate and hypophosphorous acid yields cuprous hydride, the further decomposition of which leads to the formation of the so-called copper sponge. The latter, when left in contact with the acid, continues to evolve hydrogen until the hypophosphorous acid is wholly oxidised to phosphorous acid. This last-named change is also brought about by copper obtained from finely powdered cupric oxide by reduction with hydrogen, but not by any other form of metallic copper. The authors find that neither this hydrogen-reduced copper nor the copper sponge referred to consists of the pure metal, but that both are cupric hydride, Cu H_2 . This hydride forms a reddish-brown, sponge-like mass, or a chocolate-coloured powder, which reduces potassium chlorate in solution to chloride, the ferricyanide to ferrocyanide, and the nitrate to nitrite and ammonia. It decomposes syrupy hypophosphorous acid with evolution of non-inflammable phosphoretted hydrogen.

Copper Bromide. P. Sabatier. (*Comptes Rendus*, cxviii. 980-983 and 1260-1263.) When a weak solution of cupric bromide having a blue colour is evaporated at the ordinary temperature, it changes to green, and finally to reddish-brown, and then deposits black, deliquescent prisms of the anhydrous salt Cu Br_2 . At a very low temperature the brown solution may yield green, needle-shaped crystals of the composition $\text{Cu Br}_2, 4 \text{H}_2 \text{O}$; but these soon part with their water on exposure to dry air. With alcohol the anhydrous bromide forms opaque, yellowish-red solutions.

On adding a very small quantity of cupric bromide to concentrated hydrobromic acid, a purple coloration of such intensity is produced that the reaction may serve as a most delicate test for copper, more sensitive even than the ferrocyanide reaction. When a small quantity of the anhydrous salt or of the brown aqueous solution is added to a saturated solution of potassium bromide, a similar purple coloration results which disappears on dilution. This purple solution, when concentrated, yields green crystals of the hydrate, $\text{Cu Br}_2, 4 \text{H}_2 \text{O}$. The author is inclined to think that the reddish-brown solutions contain anhydrous cupric bromide, while the purple solutions contain a hydriobromide of this salt or a double bromide.

Blue Copper Acetate. C. Astre. (*Chem. Centr.*, 1894, i. 141.) Blue crystals of copper acetate are obtained from a solution of verdigris acidified with acetic acid, provided the specific gravity of the solution is not less than 1.15. At lower densities green crystals or a mixture of green and blue crystals are formed.

Probable Existence of a Platinum Subchloride. M. C. Lea. (*Amer. Journ. Sci.* [3], xlviii. 397-401.) When potassium platinochloride is heated with potassium hypophosphite and a large quantity of water for upwards of twenty hours, or until the orange colour has changed to ruby and finally to dark brown, a solution is obtained in which potassium hydrate produces a brown precipitate soluble in an excess of the alkali, while ammonia produces a similar precipitate insoluble in excess. This compound is supposed to be a subchloride.

Solubility of Silver Chloride, Bromide, and Iodide in Inorganic and Organic Solvents. E. Valenta. (*Monatshefte*, xv. 249-253.) The author publishes tables showing the solubility of these salts in solutions of stated strength of the following chemicals: sodium hyposulphite, ammonium hyposulphite, sodium sulphite, ammonium sulphite, ammonium carbonate, ammonium hydrate, manganous chloride, potassium cyanide, potassium sulphocyanide,

ammonium sulphocyanide, calcium sulphocyanide, barium sulphocyanide, aluminium sulphocyanide, thiocarbamide and allylthiocarbamide. For details reference should be made to the original.

Iron Phosphide. L. M. Dennis and B. S. Cushman. (*Journ. Amer. Chem. Soc.*, xvi. 477-485.) By passing phosphoretted hydrogen over ferrous chloride at a red heat the authors obtained a product having a composition represented by the formula Fe P , and not Fe_3P_4 as had been expected.

Action of Ferric Sulphate on Potassium Iodide and Hydriodic Acid. K. Seubert and R. Rohrer. (*Zeitschr. für anorg. Chem.*, 1894, vii. 137-153.) The reaction between ferric sulphate and potassium iodide or hydriodic acid is found by the authors to take place in a manner analogous to that described by Seubert and Dorrer for ferric chloride (*Year-Book of Pharmacy*, 1894, 25). It is, however, slower and less complete.

Action of Ferric Acetate on Potassium Iodide and Hydriodic Acid. K. Seubert and R. Rohrer. (*Zeitschr. anorg. Chem.*, vii. 393-405.) When solutions of ferric acetate and of potassium iodide are mixed, no liberation of iodine takes place, not even in the presence of a large proportion of acetic acid. But on adding hydrochloric or sulphuric acid to the mixture, iodine is set free, and when the ratio of acid to the ferric acetate is three equivalents to one equivalent, the quantity of iodine liberated is equal to that set free by an equivalent amount of ferric chloride or sulphate. Ferric acetate liberates iodine from hydriodic acid, but the quantity liberated is much less than in the case of ferric chloride or sulphate. The addition of hydrochloric or sulphuric acid to the mixture increases the amount liberated until it nearly approaches the proportion set free in the case of ferric chloride and sulphate.

Sodium Hyposulphite intended for Standardising Iodine Solutions. C. Meineke. (*Chem. Zeit.*, xviii. 33, 34.) By treating the powdered salt with alcohol of 96 per cent. strength, filtering, removing the excess of alcohol by washing with ether, and then expelling the latter in a current of dry air, the hyposulphite is obtained in a perfectly dry condition, in which it is excellently suited for standardising solutions of iodine.

Occurrence of Vanadium in Commercial Caustic Soda. H. L. Robinson. (*Chemical News*, lxx. 199.) On saturating a solution of caustic soda with washed sulphuretted hydrogen, the author observed the formation of a deep purple coloration, which, on exposure to light and air, slowly faded to yellow and deposited a brown precipitate. This was found to be due to the presence of

vanadium, which, however, did not appear to exist in the soda in the form of vanadate.

Preparation of Pure Ammonium Nitrite. S. P. L. Sørensen. (*Zeitschr. für anorg. Chem.*, vii. 33-40.) The gas evolved in the action of nitric acid on arsenious anhydride is passed over coarsely powdered ammonium carbonate, the resulting mass treated with alcohol, and the resulting solution of ammonium nitrite separated from the undecomposed carbonate by filtration. The nitrite is then precipitated from the alcoholic solution by ether, and finally purified by re-solution in strong alcohol and reprecipitation with ether.

Potassium and Sodium Phosphides. A. Joannis. (*Comptes Rendus*, cxix. 557.) The author has obtained compounds of the formulæ $P H_2 K$ and $P H_2 Na$, both of which are decomposed by water with evolution of phosphoretted hydrogen. A description of these salts and their mode of preparation will be found in the original paper.

Sodium Pyrophosphates. T. Salzer. (*Archiv der Pharm.*, ccxxxii. 365-375.) The author describes *trisodium hydrogen pyrophosphate*, $Na_3 H P_2 O_7 + H_2 O$, also a similar salt with 7 molecules of water, and a sodium *trihydrogen pyrophosphate* of the formula $Na H_3 P_2 O_7$. For particulars the original should be consulted.

Barium Nitride. M. Berthelot and M. Matignon. (*Ann. Chim. Phys.* [7], ii. 144.) When a solution of ammonium nitride is treated with an equivalent proportion of barium hydrate, and the product evaporated under diminished pressure at a low temperature, crystals of barium nitride are obtained, having a composition represented by the formula $Ba N_6$.

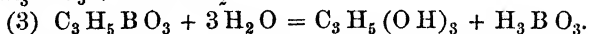
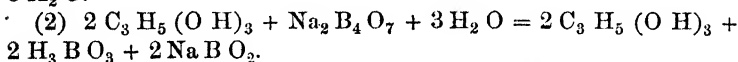
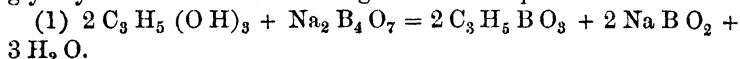
Preparation of Pure Potassium Ferricyanide. M. S. Walker. (*Amer. Chem. Journ.*, xvii. 68.) A pure preparation is readily obtained by dissolving 26 grams of potassium ferrocyanide in 200 c.c. of cold water, acidifying the solution with 8 c.c. of strong hydrochloric acid, and slowly adding a solution of potassium permanganate containing 2 grams of this salt in 300 c.c. of water until the ferrocyanide is completely oxidised. The resulting liquid is neutralised with calcium carbonate, filtered, the filtrate evaporated to the point of crystallization, and the product purified by re-crystallization.

Basic Organic Bismuth Salts. B. Fischer and B. Grützner. (*Archiv der Pharm.*, 1894, ccxxxii. 460-466.) The basic bismuth salts described by the author are a *paracresotate*, a *metacresotate* and a *tartrate*, of which the two former form needle-shaped crystals,

while the last named is an amorphous powder. For particulars the original should be consulted.

Bismuth Nitrosalicylates. H. Causse. (*Comptes Rendus*, cxix. 690-699.) The author describes a *bismuth nitrosalicylate* of the formula $[C_6H_3(NO_2)(OH) \cdot COO]_3Bi + 2H_2O$, obtained in long silky needles from the mother liquor from the preparation of bismuth salicylate; also a *basic bismuth nitrosalicylate* of the composition $OH \cdot Bi \left\langle \begin{smallmatrix} C & O & O \\ \hline & O & \end{smallmatrix} \right\rangle C_6H_3 \cdot NO_2 + H_2O$; and a second basic salt of the formula $Bi_2(OH)_2[C_6H_3(NO_2)(OH) \cdot COO]_2 + H_2O$. Any of these three salts, as well as the *nitrosalicylic acid* obtained from them by the action of boiling water, produce a deep red coloration with ferric chloride.

Action of Glycerin on Borax. L. F. Kebler. (*Amer. Journ. Pharm.*, September, 1894, 428-431.) The author regards borax as sodium tetraborate, and offers the following equations as an explanation of the well-known liberation of boric acid from it on treatment with glycerin. The first of these equations shows the action of anhydrous glycerin upon anhydrous borax, in which no liberation of boric acid takes place; the second is given in explanation of the interaction of the two substances in the presence of water, resulting in the formation of boric acid and sodium metaborate; while the third represents the action of water on the glyceryl borate formed according to the first equation.



The water which is shown to form in the first equation is volatilised by the heat employed in the process, and therefore has no influence on the reaction.

The author looks upon the action of glycerin in the decomposition of borax as a catalytic one, comparable to that of sulphuric acid in the conversion of alcohol into ether.

Hydrolysing Action of Glycerin. E. Donath. (*Journ. prakt. Chem.* [2], xlix. 546-548.) The author's experiments show that cane sugar, milk sugar, maltose, and raffinose can be hydrolysed with glycerin (containing about 20 per cent. of water) at 120°-130° in the same manner and the same order of facility as with dilute acids. Anhydrous glycerin seems to have but little action, and it is therefore supposed that its hydrates contained in the

aqueous solution undergo dissociation at the elevated temperature, and that the hydrolysis is effected by the nascent molecules of water.

Solubility of Inorganic Salts in Organic Solvents. S. v. Laszczynski. (*Ber. der deutsch. chem. Ges.*, xxvii. 2285-2288.) The author gives tables of the solubilities of copper chloride, mercuric chloride, mercuric iodide, cobalt chloride, stannous chloride, lithium chloride, lead iodide, potassium iodide, silver iodide, silver nitrate, bismuth nitrate and potassium thiocyanate in ethyl ether, ethyl acetate, acetone, amyl alcohol, benzene, aniline, and pyridine.

Solubility of Acid Potassium Tartrate in Alcohol of Various Strengths. J. A. Roelofsen. (*Amer. Chem. Journ.*, xvi. 464-467.) The author's results are summarized in the following table:—

Milligrams of Potassium Acid Tartrate dissolved in 10 c.c.

Temp.	Alcohol, percentage of.									Water.
	90.	80.	70.	60.	50.	40.	30.	20.	10.	
0°	6.2	6.4	4.9	6.0	6.0	6.2	7.0	10.8	17.3	30.1
5	5.5	6.0	5.1	6.0	6.8	6.8	7.1	13.2	18.8	32.0
10	6.2	6.2	5.1	5.8	6.4	7.0	8.6	16.0	27.0	41.1
15	5.3	6.2	6.2	6.2	5.5	7.7	8.8	15.8	23.9	44.3
20	6.4	6.4	6.2	6.4	7.0	9.6	11.3	17.1	29.3	49.0
25	4.7	5.5	6.0	6.8	7.0	10.3	11.7	21.4	36.4	54.1
30	4.7	6.0	6.8	7.5	8.5	11.0	13.1	24.8	39.9	69.2
35	1.9	5.1	5.9	6.8	9.0	12.4	18.8	28.7	49.3	83.8
40	1.7	5.3	5.8	7.0	10.2	14.9	23.1	37.7	53.6	95.9
45	1.7	5.3	6.0	7.9	10.7	16.5	25.8	44.2	72.6	112.8
50	1.5	5.1	6.0	8.1	12.8	19.0	29.7	53.6	87.2	124.8

Derivatives of Tartaric Acid. C. A. Bischoff and P. Walden. (*Liebig's Annalen*, cclxxix. 138-152.) The authors describe a number of derivatives obtained by the action of phosphorus pentachloride on tartranilide and on tartaric paratoluidide. For details reference should be made to the original paper.

Action of Heat on Maleic Acid. S. Tanatar. (*Ber. der deutsch. chem. Ges.*, xxvii. 1365-1368.) Skraup's observation that on heating dry maleic acid at 180°-190° malic acid is formed, is not confirmed. When heated with benzene, maleic acid yields fumaric acid, maleic anhydride and water. The occurrence of

malic acid, among the products of this reaction, as observed by Skraup, is attributed to the interaction of fumaric acid and water at the high temperature.

Citric Acid and its Compounds with the Alkalies. T. Salzer. (*Archiv der Pharm.*, ccxxxi. 514-521.) Buchner and Witter have shown that anhydrous and hydrated citric acids, when converted into lead salts and regenerated from these by decomposition with sulphuretted hydrogen, are again obtained in the same form in which they were used. The potassium and sodium salts prepared from the anhydrous acid, however, are found by the author to be identical with those obtained from the hydrated acid.

Pure anhydrous citric acid fuses at 160°C ., and is readily obtained by slowly heating the finely powdered hydrated acid at 55° . Monosodium citrate prepared from the anhydrous acid crystallizes with $1\text{H}_2\text{O}$, and dissolves in about $4\frac{1}{2}$ parts of water at 18° and $1\frac{1}{4}$ parts at 100° , being slightly more soluble than the anhydrous salt. The disodium citrate described by Heldt is found to be monohydrated, but the author's investigation indicates the existence of a salt crystallizing with $2\frac{1}{2}\text{H}_2\text{O}$, and soluble in about 3 parts of cold water. It loses most of its water of crystallization at 100° . Anhydrous monopotassium citrate can be obtained in crystals belonging to the triclinic system.

Presence of Citric Acid in Milk. L. Vaudin. (*Pharm. Journ.*, from *Ann. de l'inst. Pasteur*, viii. 502.) The author shows that citric acid exists in cows' milk in the form of an alkaline citrate, which serves to keep in solution the calcium phosphate; and that the alkaline citrates and phosphates and calcium phosphate are present in the liquid in proportions which are relatively definite. Cows' milk contains from 1.0 to 1.5 gram of citric acid per litre, and mares' milk from 0.6 to 0.8 gram per litre. In the author's opinion this acid is formed in the mammary gland at the expense of the lactose, and that the citrogenic function of the gland, variable in different species, assures the partial solubility of the calcium phosphate contained in the milk.

Formation of Citric Acid in the Oxidation of Cane Sugar by Permanganate. T. L. Phipson. (*Chem. News*, lxxi. 296.) The author reports that during the action of a moderate quantity of strong permanganate solution on a slightly acidulated solution of cane sugar, citric acid is formed at an ordinary temperature. Oxalic acid is also produced, but only if the permanganate is used in excess.

Syntheses in the Sugar Group. E. Fischer. (*Ber. der deutsch. chem. Ges.*, 1894, xxvii. 3189-3232.) This paper is a compilation of the work accomplished by the author and his collaborators, together with the more important researches of other chemists in the same domain since the year 1891. For details reference should be made to the original.

Decomposition of Glucose by Alkalies. F. Gaud. (*Comptes Rendus*, cxix. 604-606.) When glucose is boiled with alkaline cupric solution, the greater part is oxidised to tartronic acid, together with small quantities of formic and oxalic acids, but a small portion of the glucose is, at the same time, attacked by the alkali alone, with production of lactic and oxalic acids, phenols, two isomerides of dihydroxyphenylpropionic acid, and, when the glucose is in excess, melassic and glucic acids, constituting the greater part of the resinous products.

Synthetic Glucosides. E. Fischer and L. Beensch. (*Journ. Chem. Soc.*, from *Ber. der deutsch. chem. Ges.*, xxvii. 2478-2486.) The synthetic glucosides described in this paper were prepared by the method already published (see *Year-Book of Pharmacy*, 1894, 63).

Ethylglucoside, $C_6H_{11}EtO_6$, has now been obtained in the crystalline condition; the method is, however, somewhat lengthy and complicated. When pure, it crystallizes in mammelated groups of colourless needles, and melts at 65° . An aqueous solution containing 9.47 per cent. was found to have a sp. gr. of 1.024, and a specific rotatory power at 20° $[\alpha]_D = +140.2^\circ$; birotation was not observed. It does not reduce Fehling's solution when boiled with it for a short time, and is hydrolysed with tolerable rapidity when warmed with acids, somewhat more slowly, however, by invertase at 50° . The behaviour towards yeast has already been described by Fischer and Thierfelder.

Methylgalactoside, $C_6H_{11}MeO_6$, crystallizes in delicate needles containing 1 mol. H_2O ; it has a sweet taste, is sparingly soluble in cold alcohol, and the anhydrous compound melts at 111° - 112° . An aqueous solution containing 9.92 per cent. has a sp. gr. of 1.0296, and a specific rotatory power $[\alpha]_D +163.4^\circ$; birotation was not observed; it only reduces Fehling's solution when boiled therewith for a protracted period, is readily hydrolysed by dilute acids, but apparently not by invertase; it is not fermented by Froberg yeast.

Ethylgalactoside, $C_6H_{11}EtO_6$, forms colourless needles, melts at 138° - 139° (corr.), remains unaltered when treated with invertase or

with Froberg yeast, and has a specific rotatory power $[\alpha]_D = +178.75^\circ$.

Benzylarabinoside, $\text{C}_7\text{H}_7\text{O}_5$, crystallizes in colourless needles, melts at 172° – 173° (corr.), has a faint bitter taste, is readily hydrolysed by acid but not by invertase, and is not fermented by Froberg yeast. An aqueous solution containing 1.03 per cent. had a specific rotatory power $[\alpha]_D = +215.2^\circ$.

Propylglucoside and *glycerylglucoside* (from glycerol and glucose) were only obtained in the amorphous condition.

Glucosidogluconic acid, $\text{C}_{12}\text{H}_{22}\text{O}_{12}$, is obtained by the interaction of glucose and gluconic acid, under the influence of hydrogen chloride, as an amorphous powder, consisting of a mixture of the acid and the lactone; it was isolated by a complicated process. An aqueous solution of this product was precipitated by basic lead acetate and basic lead nitrate. The salts are readily soluble in water and amorphous; the calcium salt was analysed. When the acid is warmed on the water-bath with 5 per cent. sulphuric acid, it is hydrolysed, yielding glucose and gluconic acid. The calcium salt was found not to ferment with Froberg yeast, and to be unattacked by invertase. The authors consider that the acid is either a structural isomeride or a stereo-isomeride of maltobionic acid; they have not succeeded in transforming the acid or its lactone into the corresponding sugar, which they conjectured might possibly turn out to be identical with isomaltose.

Galactosidogluconic acid, *arabinosidogluconic acid*, *glucosidoglycollic acid*, and *glucosidoglyceric acid* were also prepared.

The Hydrolysis of Maltose by Yeast. G. H. Morris. (*Proc. Chem. Soc.*, No. 150.) Fischer has shown (*Ber. der deutsch. chem. Ges.*, 1894, 2985, 3479) that air-dried yeast and its extract, when digested with a solution of maltose, readily converts a very considerable proportion of the latter into dextrose, and also that the extract of moist yeast cells which had been ruptured by trituration with powdered glass possesses the same power. He also states that when unruptured yeast-cells are digested with maltose solution for three days in presence of chloroform, some 40 per cent. of that sugar is converted into dextrose. He chiefly used pure cultures of Froberg yeast in his experiments, but he also examined low-fermentation yeast, and pure cultures of other races, with similar results.

Having in view the important nature of the subject, and the bearing it has upon the determination of cane sugar in the presence of maltose by inversion with yeast, the author has

repeated Fischer's experiments. He has obtained results confirming the latter's statements as to the action of air-dried yeast and its extract, and also of ruptured moist yeast, but was quite unable to obtain any evidence of hydrolysis when moist and well-drained yeast was employed, although both pure cultures of Froberg yeast and ordinary London brewery yeast were used. In none of his experiments (which are described in the paper) was the slightest evidence obtained of the presence of dextrose, the analytical results showing the presence of maltose, and maltose only, in the fermenting solution.

In order to obtain some explanation of this remarkable difference in the behaviour of well-drained but moist yeast, and of air-dried yeast, a quantity of the former was digested with chloroform water for 20 hours, in order to kill the cells, and then air-dried; any decomposition during drying, due to vital changes, was thus prevented. The dried yeast thus obtained possessed the same power as that dried in the ordinary way, and the author stated that Mr. F. W. Thompson had informed him that the yeast liquor, obtained as described in the paper of O'Sullivan and Thompson on invertase, which is manifestly a product of the decomposition of the yeast, and which possesses the power of inverting cane sugar to a most marked extent, was without action on maltose. That the action of dry yeast is not due to the cells being ruptured during powdering was shown by the fact that the horny mass remaining when yeast is dried on a porous tile was just as active when used in that form as when finely powdered before addition to the maltose solution.

The dry yeast has also the power of liquefying starch paste, and of producing dextrose from a starch-conversion from which all the soluble portions have been removed by repeated treatment with 80 per cent. alcohol.

The author is making further experiments to ascertain the cause of the hydrolysing action of dry yeast.

Anhydrous Maltose. C. A. Lobry de Bruyn and F. H. van Leent. (*Rec. Trav. Chim.*, 1894, xiii. 220.) When maltose is heated at 130° – 135° , or in a vacuum at 105° , it parts with one molecule of water and forms an anhydride, which has a specific rotatory power $[\alpha]_D = 140.7^{\circ}$. The same anhydride can also be obtained by boiling maltose with absolute alcohol. On exposure to air it is gradually reconverted into ordinary maltose by absorption of water.

Action of Diastase on Starch. A. R. Ling and J. L. Baker. (*Proc. Chem. Soc.*, No. 146.) The authors have carried out

numerous experiments in order to prove or disprove the existence of Lintner's so-called isomaltose, which is said to be one of the products of the hydrolysis of starch (*Ber. der deutsch. chem. Ges.*, xxvi. 2538). As the result of a study of the action of precipitated diastase (prepared from low-dried distillers' malt by Lintner's method) on starch, they have isolated a very hygroscopic substance having some of the properties of Lintner's supposed compound but differing from it in others. The results of its analysis agree with the formula $C_{12}H_{22}O_{11}$. From a number of observations described in the paper the authors are inclined to think that the substance in question may possibly contain the simple dextrin $C_{12}H_{20}O_{10} + H_2O$, a view which derives some support from the fact that the sp. gr. of the solution remains unaltered after being submitted to the action of diastase.

When starch paste is treated at 70° with the diastase obtained from pale brewers' malt, which is dried at a much higher temperature than that manufactured for distillers, the alcoholic extract of the product yields, on treatment with phenylhydrazine, a small quantity of glucosazone, and an osazone which, when repeatedly recrystallized from hot water, has all the properties of Lintner's so-called isomaltosazone. On analysing this substance, it gave the numbers of a *triosazone*, and the authors are therefore inclined to conclude that a triose, $C_{18}H_{32}O_{16}$, is one of the products of the action of diastase on starch, and are now attempting its isolation.

Note on the Action of Diastase on Cold Starch-Paste. H. T. Brown and G. H. Morris. (*Proc. Chem. Soc.*, No. 148.) The authors draw attention to the generalisation which they claim to have established in previous communications, namely, that the products of a starch transformation, or any part of them separated by any method of fractionation, can always be expressed, in the terms of maltose, having an optical activity of $[\alpha]_{D^{36}} = 150^\circ$, and a cupric-reducing power of $\kappa_{3.66} = 61$, and of dextrin, having an optical activity of $[\alpha]_{D^{36}} = 216^\circ$ and no reducing power; in other words, knowing the cupric-reducing power of any starch product, the optical activity can be predicted with accuracy, and *vice versa*. This fact is quite independent of any consideration of the true nature of the intermediate products between starch and maltose, and has been ignored by certain recent workers.

Combinations of Starch with Iodine. G. Rouvier. (*Comptes Rendus*, cxviii. 743, 744. From *Journ. Chem. Soc.*) Compare also abstract, *Year-Book of Pharmacy*, 1894, 32. When an aqueous solution of starch is mixed with iodine in excess, but in quantity

insufficient to form the compound $(C_6H_{10}O_5)_{16} I_5$, the quantity of iodine absorbed increases with the quantity added. The proportion of iodine that enters into combination for a given quantity of iodine added decreases, however, as the percentage of iodine in the product increases. When this percentage is between 13 and 17.5, the quantity of iodine taken up is practically equal to the cube root of the quantity of iodine added. Below 13 per cent. the quantity of iodine taken up increases more rapidly, but, on the other hand, above 17.5 per cent. it increases much more slowly.

Rice starch behaves in exactly the same way as wheat starch, but potato starch seems to combine with a smaller proportion of iodine even in presence of a large excess of the latter.

Blue Iodide of Starch. C. Meineke. (*Chem. Zeit.*, 1894, xviii. 157-160.) The author points out that an aqueous solution of iodine, if free from hydriodic acid, can be added to solution of starch until the mixture is distinctly yellow, without the formation of the blue combination. The blue colour, however, is developed on adding the smallest quantity of potassium iodide to the mixture. He further shows that the chlorides of potassium, sodium, ammonium, calcium, and barium, as well as the sulphates of potassium, sodium, ammonium, and magnesium, and likewise borax and a number of other salts, produce more or less the same effect as potassium iodide, and concludes from these observations that, contrary to Mylius's statement, potassium iodide or hydriodic acid is not an essential constituent of blue iodide of starch.

The Constitution of Iodide of Starch. C. Lonnes. (*Zeitschr. für analyt. Chem.*, xxxv. 436.) The author's results confirm the conclusion previously arrived at by Mylius that hydriodic acid is an essential constituent of the blue iodide of starch.

The Physical Nature of Blue Iodide of Starch and of "Dissolved" Starch. F. W. Küster. (*Liebig's Annalen*, cclxxxiii. 360-379.) The author points out that the amount of iodine which either dry or dissolved starch takes up from a solution of iodine in potassium iodide varies with the strength of the solution, and describes a number of experiments the results of which lead him to the conclusion that blue iodide of starch is neither a compound nor a mixture, but a well-defined, solid solution of iodine in starch. "Dissolved" starch is regarded by the author as resembling an emulsion rather than a solution.

Starches in Different Varieties of Cacao. E. S. Bastin. (*Amer. Journ. Pharm.*, August, 1894, 369-377.) The author gives a detailed description, illustrated by woodcuts, of the starch granules oc-

curing in different commercial varieties of cacao, and affords proof of the essential likeness of the starches of all these varieties. The granules are exceedingly small and spherical, or nearly so, when simple. The hilum is central, usually quite distinct and sometimes fissured; the fissure may be simple and straight or somewhat curved, angular or stellate. The hilum is usually surrounded by one or two circular lines, but otherwise the granules are mostly unmarked and smooth. Some of them are compound, and these may be double, triple, or even quadruple. From rice starch they are at once distinguished by their spherical shape, the grains of rice starch being angular. The granules of nearly all commercial starches are larger than those of cacao.

Chitin and Other Cellulose-like Substances. F. Hoppe-Seyler. (*Ber. der deutsch. chem. Ges.*, xxvii. 3329-3331, and xxviii. 82.) The author has studied the action at 180° of potassium hydrate on chitin and tunicin. The latter is found to remain intact like ordinary cellulose, but the former is converted into a new body, *chitosan*, and acetic acid. Chitosan, when treated with strong hydrochloric acid, behaves like chitin, yielding acetic acid and glucosamine. These results are regarded as confirmatory of Schmiedeberg's view of the constitution of chitin.

Occurrence of Chitin in Fungi. E. Gilson. (*Comptes Rendus*, cxx. 1000.) The author has obtained this cellulose-like substance from *Agaricus campestris* and a number of other fungi named in the paper, in which the process of isolation and the properties of the product are also described in detail.

Purification of Alcohol. E. J. Maumené. (*Comptes Rendus*, cxix. 1014.) The alcohol is shaken with a small quantity of an aqueous solution of potassium permanganate, and the mixture allowed to stand for some time, after which a small proportion of chalk is added, and the mixture distilled.

Purification of Ether. M. Lassar-Cohn. (*Liebig's Annalen*, cclxxxiv. 226-232.) The method of purification adopted by the author is as follows:—1500 c.c. of ether are heated with 25 grams of sulphuric acid, 20 grams of potassium bichromate, and 50 c.c. of water for 24 hours in a reflux apparatus. The mixture is then distilled and the distillate mixed with phenylhydrazine, from which it is again distilled after 24 hours. A few grams of salicylic acid are now dissolved in the ether, the solution is allowed to stand for 24 hours, after which it is once more distilled. The whole process is then repeated. Ether of exceptional purity is thus obtained.

Report on Spirit of Nitrous Ether. W. Smith. (*Pharm. Journ.*, 3rd series, xxv. 809.) In order to ascertain what practical effect the many papers on this subject have had on the quality of this preparation as met with in commerce, the author has examined sixteen samples from various sources, and has found the volumes of nitric oxide yielded by them with the official test to vary between none and 350. His results lead him to favour the opinion that this preparation should be omitted from the Pharmacopœia, or that some better menstruum than rectified spirit should be used as a preservative.

Butylchloral. M. Tarugi. (*Gazz. Chim. Ital.*, xxiv. i. 229-236. From *Journ. Chem. Soc.*) The author confirms Pinner's description of α - and β -butylchloralacetamide; they melt at 158° and 170° respectively. The α - and β -butylchloralbenzamides, however, melt at 135° and 146° respectively, instead of at 150° and 170° as stated by Pinner.

Two *butylchloralformamides*, $C_2HMeCl_3 \cdot CH(OH) \cdot NH \cdot COH$, are produced by the interaction of formamide and butylchloral; they may be separated by crystallization from dilute alcohol. The α -compound melts at 125° and the β - at 132° .

On distilling α - and β -butylchloralacetamides with dilute sulphuric acid, they seem to yield the same butylchloral hydrate. The two hydrates are, however, certainly different, for on treating the one derived from the α -amide with acetamide the α -compound is regenerated, whereas the hydrate from the β -amide yields β -butylchloralacetamide. The difference does not seem to be due to optical isomerism.

Chloralose. A. Petit and M. Polonovski. (*Bull. Soc. Chim.* [3], xi. 125-133.) This hypnotic has been further examined by the authors, who find the rotatory power in a 5 per cent. solution in 98 per cent. alcohol to be $[\alpha]_D = +19.4^{\circ}$ at 20° - 22° , whilst a solution in 4 per cent. potash gives $[\alpha]_D = +15^{\circ}$ at the same temperature. They confirm the indifference of both chloralose and parachloralose towards ammoniacal silver nitrate, but find, contrary to the statement of Hanriot and Richet (*Year-Book of Pharmacy*, 1894, 192), that both these substances reduce Fehling's solution on boiling. If, however, ammonia be added in sufficient quantity to redissolve the precipitate formed on adding sodium hydrate to silver nitrate, a solution is obtained which is reduced by chloralose at a temperature of 70° . Hot solutions of the alkalies eliminate chlorine from chloralose and parachloralose with the development of a brown coloration, and a similar result, accom-

panied by evolution of carbonic anhydride, is produced by sodium carbonate. When boiled for some hours with dilute baryta water, chloralose gives rise to products identical with those obtained on subjecting glucose and chloral to similar treatment, and the authors therefore conclude that under these conditions chloralose is first split up into glucose and chloral, these substances undergoing further decomposition in presence of the hot alkali. The behaviour of chloralose towards dilute acids fully confirms this view. When boiled for three hours with 20 per cent. sulphuric acid, chloral and glucose are formed, and if hydrochloric acid is employed, the reaction proceeds almost quantitatively; hydrolysis is also effected when chloralose is boiled with distilled water. Parachloralose, owing to its insolubility, undergoes decomposition more slowly than the isomeric compound, although identical products are obtained.

In conclusion the authors discuss the bearing of these results on the probable constitution of chloralose.

The Decomposition of Chloroform containing Alcohol. D. Brown and D. R. Brown. (*Pharm. Journ.*, 3rd series, xxv. 836, 837.) The authors refer to their controversy with Schacht and Biltz on this subject (*Year-Book of Pharmacy*, 1894, 33), and to a more recent article in the *Ber. der Pharm. Ges.*, October, 1894, by Schacht, in which the latter defends the position previously taken up by him. In reply, the authors point out that Schacht has failed to prove that ethyl chloride and chloroformic ether are produced in decomposing alcohol-reduced chloroform, and that he has furnished no evidence to show that they give reactions similar to those of alcohol. On the other hand, they claim to have proved that at the time decomposition is first recognised by zinc iodide and starch, chlorine has not been produced in sufficient quantity to combine with all the added alcohol; and further to have shown that in quantities greater than it is possible for them to exist in decomposing ordinary chloroform, neither chloroformic ether, ethyl chloride, nor carbonic ether give reactions which could be mistaken for those of alcohol. Fuller explanations will be found in the original paper.

Free Acids from Beeswax. T. Marie. (*Comptes Rendus*, 1894, cxix. 428-431.) The free acids of beeswax can be readily separated by fractional crystallization from methyl alcohol, if other organic constituents of the wax are previously removed. After the wax has been extracted with boiling alcohol, the greater part of the latter is removed by distillation, and the cooled and crystallized

residue is pressed in order to remove the oleic compounds and colouring matters. The solid cake is melted, washed repeatedly with boiling water, and further decolorised by charcoal and filtration through paper, after which it is heated with lime and potash to destroy the myricin. It is then suspended in boiling water and neutralized with hydrochloric acid, whereby the calcium salts of the acids of the wax are precipitated. These are separated, washed, and dried, then treated with boiling alcohol and benzene to remove neutral substances, and decomposed. The liberated acids, after crystallization from methyl alcohol, which removes a small quantity of palmitic acid formed from the myricin, fuse at 79° – 80° . By further treatment with methyl alcohol, cerotic acid is dissolved out, which on crystallizing is found to melt at 76° , the melting point being raised to 77.5° after a single crystallization from ethyl alcohol. The author finds that crude cerotic acid, so far from being a single substance, contains from 30 to 40 per cent. of analogous acids, and he is engaged in the further investigation of this subject.

The Cleansing Action of Soap. F. Krafft and A. Stern. (*Ber. der deutsch. chem. Ges.*, xxvii. 1747–1754, 1775–1761.) The authors have repeated and extended Chevreul's experiments on the action of water on soap, and have confirmed the results arrived at by him. Their observations prove that when soap is dissolved in a large quantity of hot water, the sodium salts of palmitic, stearic, and elaidic acids separate out, along with a proportion of the free acids which varies with the amount of water used, while the liquid contains free alkali and the sodium salt of any oleic acid that may have been present in the soap, sodium oleate not being so readily decomposed by hot water. No basic salts of the soap acids occur among the products of decomposition, and the theory that soap, when acted upon by water, is decomposed into an insoluble acid soap and a soluble basic soap is therefore no longer tenable.

Ricinoleic, Ricinelaïdic, and Ricinostearolic Acids. C. Mangold. (*Monatshefte*, xv. 307–315. From *Journ. Chem. Soc.*) Ricinoleic acid distils under 50 mm. pressure at 250° , leaving a dark viscid residue in the retort. The distillate, which has the composition $C_{18}H_{32}O_2$, is a colourless oil at ordinary temperatures, but solidifies in a freezing mixture; it gives a barium salt which is insoluble in alcohol.

Ricinelaïdic acid is obtained by treating castor oil with sodium hydroxide and pouring the mixture into warm dilute hydrochloric

acid. The product is then washed with water and treated with dilute nitric acid and potassium nitrite. It crystallizes from light petroleum in white crystals, and melts at 51° ; when distilled under 15–30 mm. pressure, it boils at 240° – 250° , but at the same time decomposes, being converted into a *new acid* of the composition $C_{18}H_{32}O_2$. This crystallizes in lustrous white tablets, and melts at 53° – 54° . The *ammonium salt* crystallizes in lustrous leaflets, and is sparingly soluble in cold water. The *tetrabromocompound*, $C_{18}H_{32}Br_4O_2$, crystallizes in white nodules and melts at 80° – 81° .

Ricinelaïdic acid, when reduced with red phosphorus and iodine, and then with zinc and hydrochloric acid, is converted into stearic acid.

Ricinelaïdic hydrazide, $OH \cdot C_{17}H_{33} \cdot CO \cdot NH \cdot NHPh$, is obtained by heating the acid with phenylhydrazine at 120° . It crystallizes in tufts of slender white needles, and melts at 110° – 110.5° .

Ricinostearolic acid, $C_{18}H_{32}O_3$, is obtained by brominating pure castor oil and boiling the product with alcoholic potash; it melts at 51° . The *barium salt* crystallizes from alcohol in beautiful silky leaflets. When the acid is treated with concentrated sulphuric acid, it is converted into hydroxystearoricinic acid. This separates in white crystals and melts at 78° – 80° .

Ricinin. M. Soave. (*Pharm. Journ.*, from *Ann. di chim. e farm.*) The author extracts ricinin from castor cake by boiling with water, straining, evaporating to an extract, and exhausting with alcohol. The alcoholic solution leaves on evaporation a resinous residue in which crystals of ricinin can be seen. Dilute soda removes nearly all resin and fat, and the ricinin can then be crystallized from water. Shelled seed yielded only .03 per cent.; the shells contain .15 per cent. Heated on a water-bath with dilute soda, methyl alcohol is separated and ricinic acid formed.

Vegetable Cholesterins. E. Gérard. (*Journ. de Pharm. et de Chim.* [6], i. 601.) Various cholesterins have been obtained by the author from cryptogamic plants, such as yeasts, moulds, and lichens. The products referred to are regarded by him as forming a group partaking more or less of the characters of Tanret's "ergosterin." A full description of a number of these bodies and of their reactions is given in the paper.

Derivatives of Caffeine. L. Craemer. (*Ber. der deutsch. chem. Ges.*, 1894, xxvii. 3089–3092.) *Methylamidocaffeine*, *ethylamidocaffeine*, *hydrazidocaffeine*, *benzylidenehydrazidocaffeine*, *azimido-*

caffeine, *anilidocaffeine*, *nitrosoanilidocaffeine*, *benzoylanilidocaffeine*, *anilidocaffeidine*, *paratoluidocaffeine*, *orthotoluidocaffeine*, and *metaxylidocaffeine* are described in this paper, which should be consulted for details.

Sarcosine. W. Paulmann. (*Archiv der Pharm.*, ccxxxii. 601-639.) The hydrolysis of caffeine with baryta is found to give a very much larger yield of sarcosine than the action of ethyl chloracetate on methylamine. The author describes a number of its salts, as well as several derivatives, including *nitrosarcosine*, *benzoylsarcosine* (methylhippuric acid), and *acetylsarcosine* (methyl-aceturic acid).

Preparation of Cocaine from the Allied Alkaloids. A. Einhorn and R. Willstätter. (*Journ. Chem. Soc.*, from *Ber. der deutsch. chem. Ges.*, xxvii. 1523, 1524.) This process has hitherto been carried out by treating the alkaloids with concentrated hydrochloric acid, so as to obtain ecgonine, and then preparing cocaine from this by converting it into the benzoyl-derivative, followed by etherification. A simpler plan is to heat the alkaloids with methylic alcohol and sulphuric acid, or in a current of hydrogen chloride; in this case the methylic ether of ecgonine is directly obtained, and merely requires to be converted into the benzoyl compound. If ethyl alcohol is employed, the ethyl ether of ecgonine is obtained.

Substitution Derivatives of Cocaine. A. Einhorn and H. His. (*Ber. der deutsch. chem. Ges.*, xxvii. 1874-1879.) Also A. Einhorn and E. S. Faust. (*Ibid.*, 1880-1887.) Derivatives of cocaine, in which the substitution is in the benzoyl group, may be prepared from ecgonine by converting it into the ether, and then acting on the latter with the anhydride or chloride of a substituted benzoic acid. A large number of these derivatives are described in these papers, to which the reader is referred for particulars.

Aconitine. W. R. Dunstan and F. H. Carr. (*Proc. Chem. Soc.*, No. 147, 25-27, and 27, 28; also *Journ. Chem. Soc.*, lxvii. 459.) The authors have made unsuccessful attempts to convert benzaconine into aconitine by introducing an acetyl group into it. But in the course of these experiments they have obtained diacetyl, triacetyl, and tetracetyl derivatives of this base (benzaconine), which, unlike the acetyl derivatives of aconitine, appear to be non-poisonous.

The authors adhere to their formula for aconitine, and confirm their previous results with regard to the aurichlorides of this alkaloid.

The Chemical History of Aconitine. M. Freund. (*Ber. der deutsch. chem. Ges.*, 1895, 192-195, and *Pharm. Journ.*, 3rd series, xxv. 773, 774.) Also W. R. Dunstan and F. H. Carr. (*Pharm. Journ.*, 3rd series, xxv. 1117, 1118.) These are controversial papers, in which Freund disputes Dunstan's claim to priority with regard to the establishment of the new view of the constitution of aconitine (see *Year-Book of Pharmacy*, 1894); whilst Dunstan and Carr argue in support of this claim. For fuller information the reader is referred to the above sources.

Determination of Aconitine. J. C. Umney. (*Pharm. Journ.*, 3rd series, xxv. 860.) The process devised by the author depends on the decomposition of aconitine by complete hydrolysis into aconine, acetic and benzoic acids. It is described as follows:—

A definite weight of alkaloid or total alkaloidal residue is completely hydrolysed by heating on a water-bath for two hours, in a flask fitted with a reflux condenser, with a certain volume of alcoholic solution of a caustic alkali. The acetic and benzoic acids thus produced combine with the alkali present, the amount which has entered into combination being determined by difference by titration of the uncombined alkali with a volumetric solution of acid.

The solution after titration is again made markedly alkaline, and the alcohol dissipated on a water-bath. To this is then added sufficient excess of hydrochloric acid to liberate the whole of the benzoic acid, which is removed by successive washings with ether. The benzoic acid is then weighed, and the amount of solution of alkali which was required for its neutralisation in the first part of the process calculated. On deducting this amount from that of the total alkali required for neutralisation of the acetic and benzoic acids formed by hydrolysis, the amount required for neutralising the acetic acid formed, and thus the amount of crystalline aconitine present, is determined.

The amount of benzaconine present as such, in a total alkaloidal residue, may be determined by deducting from the total benzoic acid, liberated on hydrolysis from a definite weight of such residue, that proportion derived from the aconitine originally present, as shown by calculation from the acetic acid produced.

Laudanidine, a New Opium Alkaloid. O. Hesse. (*Liebig's Annalen*, cclxxx. 208-214.) When laudanine hydrochloride prepared from the crude base is recrystallized from water, the mother-liquor is found to contain a new alkaloid, *laudanidine*, $C_{20}H_{25}NO_4$, which is isomeric with laudanine, but differs from it

in being optically active ($[\alpha]_D = -87.8^\circ$), and in having a higher melting point (177°C.), as well as in the solubilities and other properties of some of its salts. The author considers it probable that laudanine consists of laudanidine and a dextro-rotatory base not yet isolated.

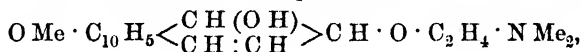
Thebaine. M. Freund and E. Göbel. (*Ber. der deutsch. chem. Ges.*, 1895, 941-944.) The authors describe several derivatives of thebaine and of *thebaol*, $\text{C}_{14}\text{H}_7(\text{OMe})_2\cdot\text{OH}$. The results of their investigation, which are detailed in the paper, lead to the inference that thebaine is derived from a dihydrophenanthrene, whilst morphine and codeine, to which thebaine is closely related, are tetrahydrophenanthrene derivatives.

Narceine Iodides. G. B. Frankforter. (*Journ. Amer. Chem. Soc.*, xvi. 361-363.) The *blue iodide* formed by direct treatment of crystals of narceine with iodine, or by the action of an aqueous solution of iodine on the base, forms prismatic needles of the composition $(\text{C}_{23}\text{H}_{27}\text{NO}_8)_3\text{I}_2 + 3\text{H}_2\text{O}$, which become anhydrous at 100°C. , fuse at $176^\circ\text{--}177^\circ$, and are slightly soluble in water and alcohol, and insoluble in ether or chloroform. The red iodide, $(\text{C}_{23}\text{H}_{27}\text{NO}_8)_3\text{I} + 3\text{H}_2\text{O}$, which is obtained by treating narceine with an alcoholic solution of iodine, and exposing the greyish-blue product at first formed to the action of the air, is a brick-red powder insoluble in water, alcohol, and ether, and fusing at 181° . Both these iodides yield a free base on careful neutralisation with sodium hydrate.

Derivatives of Codeine. W. Göhlich. (*Archiv der Pharm.*, cxxxii. 154-160.) The compounds described in this paper are *dicodeine ethylene bromide*, $(\text{C}_{18}\text{H}_{21}\text{NO}_3)_2\cdot\text{C}_2\text{H}_4\text{Br}_2 + 4\text{H}_2\text{O}$, and *dicodeine ethylene chloride*, $(\text{C}_{18}\text{H}_{21}\text{NO}_3)_2\cdot\text{C}_2\text{H}_4\text{Cl}_2 + 4\text{H}_2\text{O}$. For particulars reference should be made to the original.

Derivatives of Morphine. L. Knorr. (*Ber. der deutsch. chem. Ges.*, xxvii. 1144-1150. From *Journ. Chem. Soc.*) It has been previously shown that methylmorphimethine, on treatment with acetic anhydride, is resolved into methoxyhydroxyphenanthrene and hydroxyethyldiethylamine, the amorphous base, which is also formed, proves to be optically isomeric with methylmorphimethine, and is termed the β -form. It differs from α -methylmorphimethine (m. p. 118.5°) as follows:—It is more readily soluble in ether, the specific refractive power $[\alpha_D]^{17} = +437.3$ ($c = 3.746$), with sulphuric acid it gives a violet coloration, changing successively to blue and green on dilution; the lethal dose is twice as great. The *hydrochloride* and *tartrate* are readily soluble; the *methiodide*

crystallizes in needles, melts at 297° , and was previously obtained by Hesse, who, however, overlooked its optical relationship to the α -derivative; the specific rotatory power $[\alpha/D]^{17} = +227.45$ ($c = 1.248$). The acetyl derivative and its *methiodide* are not crystalline. Methylmorphimethine is completely decomposed by hydrochloric acid, but, by the action of hydrogen chloride at 180° , it is resolved into dihydroxyphenanthrene, methylic chloride, water, and probably chlorethyldiethylamine; part of the base is recovered as β -methylmorphimethine. The dihydroxyphenanthrene was identified by its acetyl-derivative (m. p. 158°), and has been previously prepared by v. Gerichten and O. Fischer. On distillation with zinc dust, methylmorphimethine yields 10 per cent. of its weight of phenanthrene, whilst from morphine only 3–4 per cent. is formed. These results are in complete accord with the formula—



for methylmorphimethine previously suggested by the author.

Methylmorphimethine is readily prepared by the following method:—Sodium (24 grams) is dissolved in methylic alcohol (1 litre), commercial morphine (303 grams), and methylic iodide (350 grams) added, the yield of codeïne methiodide is 90 per cent. of the theoretical. The iodide (400 grams) is dissolved in 2 litres of water, and boiled for ten minutes with 500 c.c. of a 25 per cent. solution of soda. The yield of pure base is 80 per cent. of the theoretical. Codeïne methiodide decomposes at 270° ; its specific refractive power $[\alpha/D]^{17} = -81.9^{\circ}$. α and β -methylmorphimethine differ considerably from morphine and codeïne in their physiological action; they lower the blood pressure, reduce the heart's activity, and possess no anæsthetic or soporific action, neither do they cause contraction of the pupil.

Scopolamine. E. Schmidt. (*Archiv der Pharm.*, cccxxii. 409–437.) The author has previously shown that the so-called hyoscine preparations of commerce are chiefly salts of scopolamine, $\text{C}_{17}\text{H}_{21}\text{NO}_4$. His recent experience confirms this conclusion, proving again that commercial hyoscine bromide and hyoscine iodide consist mainly of the corresponding salts of scopolamine, together with very small quantities of atropine and hyoscyamine salts and traces of another alkaloid too minute for investigation. He has now also worked upon large quantities of henbane seeds, and has obtained from them a good supply of scopolamine and hyoscyamine and small quantities of atropine, but no evidence of the existence in these seeds of Ladenburg's hyoscine, $\text{C}_{17}\text{H}_{23}\text{NO}_3$.

When an aqueous solution of scopolamine hydrobromide is treated with moist silver oxide, it is partly converted into an almost inactive *scopolamine*, which is under investigation.

Brucine. O. G. Doebner. (*Archiv der Pharm.*, ccxxxii. 693-697.) In this paper a *hydropolysulphide of brucine*, ($C_{23}H_{26}N_2O_4$)₂ $H_2S_8 + 2H_2O$, is described as an orange-red crystalline compound insoluble in water, alcohol, ether, benzene, and carbon bisulphide. It is obtained when an alcoholic solution of brucine is treated with a solution of sulphur in alcoholic ammonium sulphide.

Hydrastine and Hydrastinine. E. Schmidt. (*Archiv der Pharm.*, ccxxxi. 541-579.) The author describes the decomposition of hydrastonic acid, and strengthens the evidence in favour of the constitutional formula for hydrastine advocated by Freund, supporting his conclusions by a further study of the methyl derivatives of the alkaloid. For details the original should be consulted.

Hydrastinine, the product of the oxidation of hydrastine with dilute nitric acid, is obtained in small quantities when a mixture of hydrastine with 10 parts of soda-lime is submitted to dry distillation in an atmosphere of hydrogen.

Hydrastine. P. Fritsch. (*Liebig's Annalen*, cclxxvi. 21.) The author has effected the synthesis of hydrohydrastinine by treating piperonal-acetalamine (obtained by the interaction of piperonal and acetalamine) with sulphuric acid, reducing the resulting isoquinoline derivative thus formed by means of tin and hydrochloric acid, and then introducing a methyl group by treatment with methyl iodide. The product thus synthesized has proved to be identical with hydrastinine obtained from hydrastine.

The author's results confirm the views expressed by Freund on the constitution of hydrastine, hydrastinine, and hydrohydrastinine.

Two Alkaloids from Cactaceæ. A. Heffter. (*Ber. der deutsch. chem. Ges.*, xxvii. 2975-2979.) The alkaloids reported upon by the author are *anhaline*, $C_{10}H_{17}NO$, extracted from *Anhalonium fissuratum*, and *pellotine*, $C_{13}H_{21}NO_3$, obtained from *Anhalonium Williamsi*, the Mexican name of which is "pellote." A full description of these bases will be found in the paper.

A Poisonous Base in Cactaceæ. L. Lewin. (*Ber. der deutsch. bot. Ges.*, 1894, 283-290.) The presence of a poisonous alkaloid of the formula $C_{12}H_{15}NO_3$, resembling strychnine in its properties, has been observed by the author in several species of

Anhalonium, in *Cactus fimbriatus* and *C. pentagonus*, also in *Mammillaria uberiformis* and in *Cereus flagelliformis*.

Cytisine and Ulexine. A. Partheil. (*Archiv der Pharm.*, ccxxxii. 161-177.) The author supplies still further evidence respecting the identity of these two bases, which may now be regarded as fully established. The name ulexine should therefore be expunged from chemical literature.

Identity of Sophorine and Cytisine. P. C. Plugge. (*Archiv der Pharm.*, ccxxxii. 444-460.) Considerable quantities of sophorine were extracted from *Sophora tomentosa*, and very carefully compared with pure cytisine, $C_{11}H_{14}N_2O$, with the result that these two alkaloids proved to be identical. During this investigation many new characteristics of cytisine were determined and new derivatives formed, which are described in the paper.

It may now be considered as proved that cytisine occurs in the various species of *Cytisus*, in *Ulex europæus*, and in *Sophora tomentosa*, and it is probably also present in the poisonous species *S. speciosa* and *S. secundiflora*.

Alkaloids obtained from Granatoline (Pseudopelletierine). G. Ciamician and P. Silber. (*Ber. der deutsch. chem. Ges.*, xxvii. 2850-2861.) Compare also *Year-Book of Pharmacy*, 1894, 52. The authors supply some further information respecting granatoline and its conversion into norgranatanine. They also describe a new base, *norgranatoline*, as an oxidation product of granatoline, and likewise a reduction-product of norgranatoline for which the name norgranatenine is suggested. For details reference should be made to the original.

Alkaloids of Conium. R. Wolffenstein. (*Ber. der deutsch. chem. Ges.*, xxvii. 2611-2621 and xxviii. 302-305.) A specimen of "pure" coniine examined by the author was observed to show an abnormally high angle of rotation ($+16.4^\circ$ in a 0.992 decimetre tube at 19°), and was therefore purified by conversion into the acid tartrate. The liquor removed from the crystals of this salt by filtration was treated with potassium hydrate, and a mixture of bases thus obtained consisting of *d*-coniine and *n*-methylconiine, from which the former was separated in the form of the nitroso-derivative. When examined in a 0.333 decimetre tube the angle of rotation for *n*-methylconiine was observed to be $+22.6^\circ$. The author describes a number of *d*-coniine salts, and shows that a small quantity of this base must have been present in Ladenburg's isoconiine.

In another specimen of coniine the author detected a base identical with the γ -coniceïne described by Hofmann. Its *hydrochloride* fuses at 143° , the *hydrobromide* at 139° , the *hydriodide* at 102° , the *stannochloride* at 215° , the *picrate* at 62° , and the *aurochloride* at 69° – 70° . It is suggested that the variable and uncertain physiological action of coniine may be attributable to the presence or absence in it of variable proportions of coniceïne, which is a much more poisonous base.

Pure Dextrorotatory Coniine. A. Ladenburg. (*Ber. der deutsch. chem. Ges.*, 1894, xxvii. 3063–3066.) The author has prepared a larger quantity of synthetical coniine, and has converted it into the dextro-rotatory base by treatment with dextro-rotatory tartaric acid, as in his previous researches. After purification by three successive recrystallizations, the product was found to boil at 167.7° , and to have a specific rotation of $[\alpha]_D = +18.3^{\circ}$ and a specific gravity of 0.8438 at 23° C. The presence of isoconiine in the sample previously investigated is suggested as the cause of the difference between the present and the former results.

Nicotine and Metanicotine. A. Pinner. (*Ber. der deutsch. chem. Ges.*, xxvii. 1053–1061 and 2861–2869.) The body recently described by Étard as benzoynicotine (*Year-Book of Pharmacy*, 1894, 53) is found by the author to be a benzoyl-derivative of a secondary base isomeric with nicotine, for which the author proposes the name *metanicotine*. For the purification of the derivative, *benzoylmetanicotine picrate*, crystallizing in thin, flat prisms fusing at 128° C., is recommended in place of the platinochloride.

Metanicotine, $C_{10}H_{14}N_2$, is prepared by heating its benzoyl-derivative with concentrated hydrochloric acid in a closed tube at 100° ; it boils at 275° – 278° , has a feeble odour recalling that of nicotine, is optically inactive, and has more pronounced basic properties than nicotine. It is sparingly soluble in ether. The hydrochloride, platinochloride, aurochloride, picrate, an acetyl-derivative, and several bromo-derivatives of this base will be found described in this paper.

On heating metanicotine with a strong solution of barium hydrate for 10–12 hours at 170° , methylamine is formed, together with a new base, C_9H_9N , the *picrate* of which fuses at 151° .

Étard's constitutional formula for nicotine is again adversely criticised by the author.

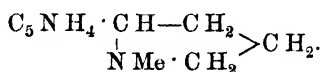
Constitution of Nicotine. F. Blau. (*Ber. der deutsch. chem. Ges.*, xxvii. 2535–2539; *Journ. Chem. Soc.*, December, 1894.) The author's previous work on this subject has proved that nicotine

consists of a pyridine nucleus combined with a closed chain containing a nitrogen atom linked to a methyl group; whilst Pinner regards it as a methylpyrrolidine trimethyleneimine ring, he believes it to be an ethyleneimine ring, and, at present, it is impossible to decide definitely between these views.

Isodipyridine, prepared by Cahours and Étard by the oxidation of nicotine, is termed by the author *nicotyrine*, and is more readily obtained by acting on nicotine with moist silver oxide. The yield is about 16 per cent. of the nicotine employed, of which about 38 per cent. is recovered. The author describes the reactions of this base as well as some of its salts and derivatives, particulars of which will be found in the original paper.

Nicotine. A. Pinner. (*Ber. der deutsch. chem. Ges.*, xxviii. 456-465.) The author shows that, in the oxidation of nicotine with hydrogen peroxide, oxynicotine, $C_{10}H_{14}N_2O$, is not the primary product, but results from the condensation of an aldehyde previously formed. Prolonged heating of oxynicotine with concentrated baryta water at $140^\circ C.$, and subsequent distillation with steam, yields *nicotol* (pseudonicotine oxide) along with nicotine. From the residue left in the retort an oil can be obtained which decomposes when heated at about 165° under 50 mm. pressure; by fractional crystallization of the mixed picrates obtained from the oily distillate, nicotine and *nicotone*, an isomeride of oxynicotine and nicotol, were isolated. Nicotone is a colourless, strongly basic oil, boiling at 253° , and possessing no reducing action.

The author gives the following constitutional formula for nicotine:—



Derivatives of Piperidine. F. B. Ahrens. (*Ber. der deutsch. chem. Ges.*, xxvii. 2088-2091.) On heating a mixture of piperidine and ethyl acetoacetate, *acetopiperidine*, $C_5N H_{10} Ac$, is obtained as a colourless oil boiling at $224^\circ C.$, which is decomposed into piperidine and acetic acid by heating with acids or alkalies. The *hydrochloride*, *hydrobromide*, *platinochloride*, and *aurochloride* of this base are described.

When a mixture of piperidine and chloroform is warmed with potassium hydrate, formylpiperidine, $C_5N H_{10} \cdot CHO$, is obtained, which has been previously described by Wallach and Lehmann, and also by Lachowicz.

Cinchonine. W. v. Miller and G. Rohde. (*Ber. der deutsch. chem. Ges.*, xxvii. 1187-1190, and 1279-1281.) When methylcinchonine and phenylhydrazine are heated together in acetic solution, a crystalline *hydrazone*, $C_{26}H_{30}N_4$, is formed which possesses basic properties, is soluble in acids, and fuses at $151.5^\circ C$. Ethylcinchonine, methylquinine, and methylquinidine behave similarly. The *hydrazone*, $C_{27}H_{32}N_4$, from ethylcinchonine melts at 152° - 153° . The *hydrazones* from methylquinidine and methylquinine both melt at 135° - 136° , have the same crystalline form, and appear to be identical.

On heating cinchonine with dilute acetic acid for 24 hours at $105^\circ C$., it yields an oil having the appearance of methylquinine and methylquinidine. It gives a purple coloration with diazobenzene sulphonic acid and a few drops of alkali; when warmed with moist silver oxide in alcoholic solution, it reduces it with the formation of a mirror, and yields a hydrazone with phenylhydrazine. When treated with methyl iodide and soda, it yields methylcinchonine and its methiodide.

The foregoing reactions are regarded by the authors as in accordance with their views on the constitution of cinchonine.

Crystallized Cinchonicine. F. Roques. (*Comptes Rendus*, cxx. 1170.) By regenerating this alkaloid from the repeatedly recrystallized oxalate, and rapidly cooling its concentrated ethereal solution with methyl chloride, it may be obtained in the form of prismatic, amber-coloured anhydrous crystals, fusing at 49° - 50° , and having a composition corresponding to the formula $C_{19}H_{22}N_2O$. Hitherto this base had never been obtained in a crystalline form.

Cinchotenine. F. Ratz. (*Monatshefte*, xv. 787-802.) Also P. Fortner, *Monatshefte*, xvi. 62-67. In the first of these papers an *ethyl derivative* of cinchotenine, $C_{18}H_{19}EtN_2O_3$, is described along with a number of its salts, while the second paper deals with the action of phosphorus pentachloride and oxychloride on cinchotenine. Details will be found in the original papers.

Benzoylquinine. A. Wunsch. (*Comptes Rendus*, cxix. 407-409; *Journ. Chem. Soc.*, February, 1895.) Schützenberger obtained benzoylquinine by the action of benzoic chloride on the alkaloid, and described it as a resinous and uncrystallizable substance. The author prepares it by adding gradually, with frequent agitation, 60 parts of pure, well-dried, and finely-powdered quinine to 100 parts of benzoic chloride, heated on a water-bath. The product, after cooling, is treated with several times its volume of cold water, which rapidly dissolves the benzoylquinine hydrochloride,

but only very slowly attacks the excess of benzoic chloride. The base is purified by precipitation with ammonia and crystallization from aqueous ether. It forms very distinct, highly refractive, colourless prisms of the composition $C_{20}H_{28}BzN_2O_2$, which are insoluble in water, but readily soluble in alcohol, benzene, chloroform, petroleum spirit, carbon bisulphide and ether. It crystallizes from all the solvents except alcohol, and the crystals, which are anhydrous, melt at 139° , but decompose at a higher temperature. It is neutral to both phenolphthaleïn and litmus, and even the basic salts are acid to litmus. It is distinguished from quinine benzoate by its insolubility in water and its resistance to the action of potassium hydrate. Like quinine, it yields a green coloration with chlorine water and ammonia, and the dilute aqueous solutions of its salts are fluorescent. A number of its salts are described in this paper.

Solubility of Quinine in Alkalies. E. Donmer and E. Deraux. (*Pharm. Journ.*, 3rd series, xxv. 916-918, 939, 940, from *Journ. de Pharm. et de Chim.*) The authors have investigated the solubility of quinine in sodium potassium and ammonium hydrates, and the influence of the various alkaline carbonates on its solubility in the hydrates named. Full details are given and the results are arranged in seven tables, for which the above sources should be consulted.

Cinchotine and Hydroquinine. G. P. M. (*Monatshefte*, 1895, 68-74.) The author has studied the action of hydriodic acid on these two bases, and describes a *cinchotine dihydriodide* of the formula $C_{19}H_{24}N_2O, 2HI$, and *hydroquinine dihydriodide*, $C_{20}H_{26}N_2O_2, 2HI$.

Cinchonigine. E. Jungfleisch and E. Léger. (*Pharm. Journ.*, from *Comptes Rendus*, 1895, 325-328.) The authors find that this isomer of cinchonine, which has a specific molecular rotatory power, is not only dimorphous, but that the two forms readily change into each other. The clinorhombic form is stable at the ordinary temperature, whilst the orthorhombic form is the same at the boiling point of ether, about 35° . Some twenty degrees, therefore, constitute the difference between the temperatures at which crystallization takes place in the two cases. Hydrate of cinchonigine can be obtained in prismatic crystals containing two molecules of water by heating the anhydrous base (m.p. 129°) with water. Cinchoniline, a close isomer of cinchonigine, also forms a hydrate, which occurs in fine needles containing three molecules of water.

New Compounds of Cinchona Alkaloids with Ethyl Iodide. Z. H. Skraup and F. K. v. Norwall. (*Monatshefte*, xv. 37-52 and 433-436.) The compounds described in this paper are *cinchonine ethiodide hydriodide*, *cinchonine ethiodide*, *iodoethylcinchonine hydriodide*, *cinchonidine ethiodide hydriodide*, *cinchonidine ethiodide*, *iodoethylcinchonidine hydriodide*, *quinine ethiodide hydriodide*, *quinine ethiodide*, *quinine diethiodide*, *iodoethylquinine hydriodide*, and *quinidine diethiodide*. For details the original should be consulted. With regard to the nomenclature adopted for these bodies the authors explain that, by way of distinction between the isomeric compounds of an alkaloid with ethyl iodide, one compound is represented by the name of the alkaloid preceded by the term "iodoethyl," whilst the second is represented by a name in which that of the alkaloid is followed by the term "ethiodide." They thus call the product obtained from free cinchonine and ethyl iodide, "iodoethylcinchonine," whilst the substance prepared from cinchonine hydriodide and ethyl iodide is called "cinchonine ethiodide."

The results of a study of the action of oxidising agents on the additive compounds of ethyl iodide with the cinchona alkaloids seem to confirm Skraup's previous supposition that in cinchonine ethiodide the ethyl group is in combination with the nitrogen atom of the quinoline group of the second half of the alkaloid molecule.

Derivatives of Digitogenin. H. Kiliani and M. Bazlen. (*Archiv de Pharm.*, 1894, ccxxxii. 334-345.) Digitogenin is converted into digitogenic acid by treating it with 10 parts of glacial acetic acid, then oxidising with a solution of 0.7 part of chromic anhydride in 1.4 parts of water, afterwards diluting with 10 parts of water and finally extracting the acid by means of ether. This process is more economical and less troublesome than the one formerly described. *Digitogenic acid oxime*, $C_{14}H_{21}O_3N$, crystallizes in needles or prisms, melts at 175° , has an acid reaction, and dissolves in sodium carbonate with evolution of carbonic anhydride.

Digic acid, $C_8H_{12}O_3$, *anhydrodigitic acid*, $C_{10}H_{14}O_3$, and a number of their compounds and other derivatives are also described in this paper.

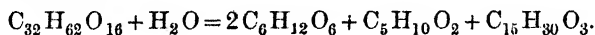
Helenin. J. Bredt and W. Posth. (*Chem. Zeitung*, xix. 163.) Helenin has been further examined by the authors, who show that its correct formula is $C_{15}H_{20}O_2$. It is neutral to test paper, and is soluble in alkalies with formation of an oxy-acid, which, on heating with water and precipitating with hydrochloric acid, again yields the lactone.

Scoparin. G. Goldschmiedt and F. v. Hemmelmayer. (*Monatshefte*, xv. 316-361.) The authors give a description of acetylscoparin, ethylscoparin, methylscoparin, ethylvanillic acid, and other derivatives and additive compounds, for details of which the reader is referred to the original. The conclusion is arrived at that the constitution of scoparin may be expressed by the formula $\text{O H} \cdot \text{C}_6\text{H}_3(\text{O Me}) \cdot \text{C}_{13}\text{H}_8\text{O}_3(\text{O H})_5$ [$=1:3:5$], and that in the group $\text{C}_{13}\text{H}_8\text{O}_3(\text{O H})_5$ there is present an atomic complex which is capable of yielding phloroglucinol when treated with potassium hydrate.

Scoparin is found to be entirely devoid of any physiological action.

Datisctin. E. Schunck and L. Marchlewski. (*Liebig's Annalen*, cclxxviii. 346-349.) Datisctin (*Year-Book of Pharmacy*, 1894, 138) is a decomposition product of the glucoside datiscin, obtained from the roots of *Datisca cannabina*. The authors have now studied the action of bromine on a solution of this body in glacial acetic acid, and find that with a small proportion of bromine, salicylic acid and bromosalicylic acid are formed. If, however, an excess of bromine is used, and the temperature of the mixture raised to the boiling point, bromanil separates on cooling, while tribromophenol remains dissolved in the mother liquor.

Convolvulin and the Products of its Hydrolysis. H. J. Taverne. (*Rec. Trav. Chim.*, xiii. 187-217.) Convolvulin, extracted from Vera Cruz jalap-root, appears to have the composition $\text{C}_{32}\text{H}_{62}\text{O}_{16}$, and yields on hydrolysis *methylethylacetic acid*, $\text{CHMeEt} \cdot \text{COOH}$, *hydroxypentadecylic acid*, $\text{CHMeEt} \cdot \text{CH}(\text{OH}) \cdot \text{C}_9\text{H}_{18} \cdot \text{COOH}$, and glucose. Of the two acid products the first is volatile and the second non-volatile and crystalline; both are described in the paper. The hydrolysis is represented by the following equation:—



The Tannin of Cloves. W. L. Peabody. (*Amer. Journ. Pharm.*, June, 1895, 300-306.) The results of the author's investigation are summarised as follows:—

I. The amount of tannin present in cloves ranges from 10 to 13 per cent. of the weight of the spice as found in the market.

II. The tannin of cloves has the same percentage composition as gallotannic acid, and yields the same decomposition products as does that compound; hence, they are identical.

Hæmatoxylin and Brasilin. J. Herzig. (*Monatshefte*, xv. 139-146.) The author finds that all the hydroxyl groups in hæmatoxylin and brasilin do not behave similarly on methylation, and considers it probable that these bodies are constituted similarly to xanthone and fluoran. A number of derivatives will be found described in this paper.

Rottlerin. A. G. Perkin. (*Proc. Chem. Soc.*, No. 146.) The three acids produced by the action of nitric acid on rottlerin (*Year-Book of Pharmacy*, 1894, 162) have been prepared in larger quantity and re-examined, with the result that they were found to contain nitrogen, and to consist of *ortho*- and *paranitrocinnamic* acids and *paranitrobenzoic acid*. *Paranitrobenzaldehyde* was also isolated from among the products of this action. A number of crystalline metallic compounds of rottlerin are described.

When boiled with sodium carbonate solution rottlerin is decomposed, yielding, together with resinous products, a substance crystallizing in garnet-coloured prisms, to which the formula $C_{29}H_{25}O_6$ has been provisionally assigned. It is insoluble in aqueous alkalis, except in presence of alcohol. For this substance the name *rottlerone* is proposed.

Quercetin Derivatives. J. Herzig. (*Monatshefte*, xv. 683-699.) The author gives a description of several bromo-derivatives of quercetin, and refers to the results of earlier investigations inducing him to regard quercetin as hydroxyfisetol, and rhamnetin as a monomethyl derivative of quercetin. The quercetin group is regarded by him as in all probability closely related to Kostanecki's chrysin, and the connection between fisetol and catechol is shown by the production of diethylprotocatechuic acid and ethylresorcyglyoxylic acid, when ethylfisetol is oxidised with potassium permanganate.

Colouring and other Principles contained in Mang-Koudu. A. G. Perkin and J. J. Hummel. (*Proc. Chem. Soc.*, No. 142.) Mang-Koudu is the root bark of *Morinda umbellata*, largely used in Java for producing fast reds in the native calico prints. The authors correct their previous statement, that its colouring matter was alizarin, and now show it to be morindone. They have isolated 11 distinct substances from the root, which also contains a free acid, the nature of which has not yet been determined. No cane sugar was found, a distinction from chay root and from madder. Full details of the methods employed in extraction and separation are given, and the behaviour of the substance as a dye stuff is described.

Presence of Several Distinct Chlorophylls in the Same Vegetable Species. A. Étard. (*Comptes Rendus*, 1894, cxix. 289-291.) The author finds that the leaves of lucerne (*Medicago sativa*) yield about 0.003 per cent. of green colouring matter containing four distinct varieties of chlorophyll, a description of which is given in his paper.

Chlorophyll. E. Schunck and L. Marchlewski. (*Liebig's Annalen*, 1894, 329-345, and 1895, 81-107.) In these papers the authors describe products of the action of hydrochloric acid and of alkalies on chlorophyll in alcoholic solutions. For details the original should be consulted.

Carminic Acid. E. Schunck and L. Marchlewski. (*Ber. der deutsch. chem. Ges.*, 1894, xxvii. 2979-2985.) On treating cochineal extract with solution of lead acetate, then decomposing the lead salt with sulphuric acid in presence of alcohol, and evaporating to dryness at a very low temperature, a product is obtained agreeing in its properties with the "carminic acid" previously described by other authors. When this is purified by precipitation from its alcoholic solution by means of ether or chloroform, and subsequent crystallization from alcohol, it is obtained in the form of small red prisms of the formula $C_{11}H_8O_4 + 2H_2O$, which assume a darker colour at $130^{\circ}C.$, and blacken without fusing at 205° . The amorphous acid, as obtained by the evaporation of aqueous solutions, shows the same behaviour. An alcoholic solution of either the amorphous or crystallized acid shows three ill-defined absorption bands, one in the green and two in the blue; in alkaline solutions, they appear in the yellow and green. A number of salts of carminic acid are described in the same paper.

Chrysophanic Acid. O. Hesse. (*Liebig's Annalen*, cclxxxiv. 191-195.) The pure acid crystallizes from alcohol in small laminæ, fusing at $178^{\circ}C.$, and having a composition corresponding to the formula $C_{15}H_{10}O_4$. In order to isolate it from rhubarb root, the latter is repeatedly exhausted with ether; the accumulated extracts, with exception of the first, are evaporated, and the residue is treated with a small quantity of alcohol, filtered, and dissolved in chloroform. After removing the solvent by evaporation, the residual acid is further purified in the usual manner.

Daturic Acid. E. Gérard. (*Comptes Rendus*, cxx. 565.) The author adduces evidence in support of his previous conclusion that this acid is not a mixture of palmitic and stearic acids, but is a body of distinct chemical individuality.

Filicic Acid. G. Dacomo. (*Gazz. Chim. Ital.*, 1894, xxiv. i. 511-523.) A description is given in this paper of the copper and ammonium salt of this acid, and also of several acid oxidation products obtained from it. For particulars the reader is referred to the original.

Angelic and Tiglic Acids. R. Fittig and M. Penschuck. (*Liebig's Annalen*, cclxxxiii. 105-117.) On heating 10 grams of angelic acid with a solution of 40 grams of soda in 160 grams of water for 20 hours in a reflux apparatus, tiglic acid is formed. The yield from these quantities under the conditions named amounts to 6.3 grams, but varies considerably with the temperature and the strength of the soda solution. Tiglic acid, when treated in the same manner, undergoes no change.

Tiglic and angelic acids, when treated in alkaline solution with potassium permanganate, yield oxidation-products which are described under the names of *tigliceric acid* and *angeliceric acid* respectively.

Synthesis of Vulpic Acid. J. Volhard. (*Liebig's Annalen*, cclxxxii. 1-21.) Benzyl cyanide is converted by ethyl oxalate and sodium ethoxide in alcoholic solution into the *dinitrile of diphenylketipic acid*, and the latter, after crystallization from amyl alcohol, is hydrolysed with sulphuric acid, whereby the dinitrile is converted into pulvic acid dilactone and pulvic acid. On treating the dilactone with a solution of potassium hydrate in methyl alcohol and acidifying the solution, vulpic acid is obtained, identical with that prepared from *Evernia vulpina*.

Abietic Acid. H. Mach. (*Monatshefte*, xv. 627-644.) The author gives a further description of abietic acid, $C_{19}H_{28}O_2$, and shows that it is neither identical nor isomeric with Maly's pimaric acid, $C_{20}H_{30}O_2$. For particulars the original should be consulted.

Synthesis of Piperic Acid. A. Ladenburg and M. Scholtz. (*Ber. der deutsch. chem. Ges.*, 1894, xxvii. 2958-2960.) When piperonal is treated with acetaldehyde in the presence of an alkali it yields *piperonalacraldehyde*, $CH_2:O_2:C_6H_3\cdot CH:CH\cdot CHO$, which crystallizes in yellow plates, fusing at 70° , boiling at 180° - 190° (20 mm.), and having a slight aromatic odour. On heating this substance with anhydrous sodium acetate and acetic anhydride, it is converted into piperic acid which is identical with the natural acid. The author gives a description of the potassium, sodium, calcium, barium, magnesium, manganese, copper, and lead salts of this acid, and also of the phenylhydrazone and the anilide of piperonalacraldehyde.

Diisosafrrole and Cubebin. A. Angeli and P. Mole. (*Gazz. Chim. Ital.*, 1894, xxiv. ii. 127-130.) *Diisosafrrole*, $(C_{10}H_{10}O_2)_2$, forms thin, white, needle-shaped crystals slightly soluble in cold alcohol, and fusing at 145° . It is obtained by heating isosafrrole with a saturated alcoholic solution of hydrochloric acid gas at 160° in closed tubes.

The authors are carrying on an investigation of cubebin, which appears to be very closely related in its constitution to isosafrrole. They have not been able to prepare Weidel's tribromocubebin, but obtained *dibromocubebin*, $C_{10}H_8Br_2O_2$, from cubebin by direct bromination. The new derivative forms small, white crystals fusing at 229° .

Dulcin (Paraphenetoilcarbamide). L. Wenghöffer. (*Apoth. Zeit.*, ix. 200-202; *Journ. Chem. Soc.*, July, 1895.) *Paraphenetoilcarbamide*, $NH_2 \cdot CO \cdot NH \cdot C_6H_4 \cdot OEt$, is obtained by gradually adding a solution of paraphenetidine in benzene or toluene to a 20 per cent. solution of carbonyl chloride in benzene or toluene, whereby paraphenetidinecarbonyl chloride, $Cl \cdot CO \cdot NH \cdot C_6H_4 \cdot OEt$, is formed; after remaining from half an hour to one hour, the mixture is filtered and the filtrate treated with ammonia gas or shaken with a strong solution of ammonia. The ammonium chloride which is precipitated is filtered off and the filtrate evaporated; the residue is washed with cold water and crystallized from boiling water. If concentrated solutions are employed in the above reaction, diparaphenetoilcarbamide, $CO(NH \cdot C_6H_4 \cdot OEt)_2$, is also formed. According to F. v. Heyden, when large quantities of the above reagents are employed, paraphenetidinecarbonyl chloride is not formed, or only in small quantities; but the reaction takes place with the formation of paraethoxyphenylic isocyanate, $CO:N \cdot C_6H_4 \cdot OEt$, which when treated with ammonia yields paraphenetoilcarbamide. Small quantities of the latter are also obtained by the action of carbamide on paraphenetidine. A good yield is, however, obtained when paraphenetidine hydrochloride is fused with carbamide; at the same time, when excess of carbamide is employed, diparaphenetoilcarbamide is formed, which, however, is easily converted into paraphenetoilcarbamide by heating it with an equivalent quantity of carbamide in a closed vessel at 150° - 160° .

Paraphenetoilcarbamide is likewise obtained by heating paraphenetidine with acetylcarbamide, carbamine chloride or urethane. It forms colourless crystals, melts at 173° - 174° , is soluble in 800 parts of water at 15° , in 50 parts of boiling water, and in 25 parts

of 90 per cent. alcohol. When boiled with water, it is gradually decomposed into diparaphenetoilcarbamide and ammonium carbonate. It dissolves completely and without any coloration in concentrated sulphuric acid, and has no injurious action on the animal organism. It can be detected by the following reaction: a small quantity is boiled with two or three drops of pure carbolic acid and sulphuric acid, then somewhat diluted with water, and to the cold solution a solution of sodium hydrate or ammonia is added, when a blue coloration is formed at the junction of the two liquids.

Preparation of Quinoline. J. Walter. (*Journ. prakt. Chem.* [2], xlix. 549, 550. From *Journ. Chem. Soc.*) For the performance of Skraup's method of preparing quinoline a flask of large capacity is necessary in order to provide for the froth generated during the reaction. This inconvenience can be avoided by heating the nitrobenzene in a flask provided with a reflux condenser and a dropping funnel, from which the mixture of aniline, glycerin, and sulphuric acid may be added by degrees. In such an arrangement a flask of 800 c.c. capacity will suffice for a charge of 48 grams of nitrobenzene, whereas by the old method a 2000 c.c. flask was necessary for 24 grams of nitrobenzene. The addition of the other constituents to 48 grams of nitrobenzene should be spread over three-quarters of an hour, and to keep their viscosity low the dropping funnel should be surrounded by a leaden steam coil. The distillation of the quinoline in steam may be effected in an iron vessel.

Synthesis of Isoquinoline. E. Bamberger and C. Goldschmidt. (*Ber. der deutsch. chem. Ges.*, xxvii. 1954-1957, and 2795.) Also C. Pomeranz. (*Monatshefte*, xv. 299-306.) When cinnamaldoxime is heated with phosphoric anhydride at 60°-70° isoquinoline is formed, and the same body is also obtained under analogous conditions from anti-cinnamaldoxime, a body formed in the preparation of cinnamaldoxime.

The yield obtained by this process is 2 per cent., but it may be raised to 10 per cent. if the mixture of cinnamaldoxime and phosphoric anhydride is heated with 3 parts of dry infusorial earth on a water-bath.

Pomeranz has continued his researches on the production of isoquinoline from benzaldehyde and amidoacetal, and has obtained a yield equal to 50 per cent. of that required by theory. Benzyldeneamidoacetal is mixed with well-cooled, concentrated sulphuric acid (3 parts), and the mixture gradually added to 3 parts of sulphuric acid heated at 160°. *α-methylisoquinoline* is obtained in

a corresponding manner from acetophenone and amidoacetal, but the yield does not exceed 15 per cent. of the theoretical quantity.

Synthesis of Quinoline. V. Kulisch. (*Monatshefte*, xv. 276-279.) The author's synthesis is effected by adding a strong aqueous solution of sodium hydrate to a solution of glyoxal in an excess of orthotoluidine, and heating the mixture in a reflux apparatus at 150° for $1\frac{1}{2}$ hours. The yield amounts to 35-40 per cent. of that required by theory.

Quinoline in Brown-Coal Tar. O. G. Doebner. (*Archiv der Pharm.*, cxxxii. 691-693.) The author has isolated quinoline from the fraction of brown-coal tar boiling at 240° - 245° . Other quinoline and pyridine derivatives are also present.

New Constituents of Wood Oil. E. Looft. (*Ber. der deutsch. chem. Ges.*, xxvii. 1542-1546.) The author has identified methylpyridine, dimethylpyridine, isobutylic alcohol, pimelic ketone, and an alcohol of the formula $C_8H_{14}O$ among the constituents of this oil. Details of the methods of separation employed are given in the paper.

Pyrazines. C. Stoehr. (*Journ. prakt. Chem.* [2], xlix. 392-403.) In this paper pyrazine picrate, pyrazine methiodide, and methylpyrazine, $C_4H_3MeN_2$, are described. The last named of these is a mobile, highly refractive, colourless liquid, boiling at 136° - $137^{\circ}C$., and having a specific gravity of 1.0441 at $0^{\circ}C$.

Pyrazine. L. Wolff. (*Ber. der deutsch. chem. Ges.*, xxvii. 2018, 2019.) The author directs attention to the discrepancies existing between his description of pyrazine and that of Stoehr, and also between the latter author's researches published at different periods. He also points out that the specimen of pyrazine obtained by Gabriel and Pinkus from amido-aldehyde agrees closely in melting and boiling point with the base described by himself.

Phenocoll. F. Nicola. (*Chem. Centr.*, 1894, i. 418, 419.) The author has further investigated this substance and some of its derivatives. The free base, prepared from the commercial chloride, forms white needles soluble in alcohol and in boiling water, containing 1 molecule of water which they lose at 80° - 90° . The anhydrous base fuses at 99.5° , and emits ammonia at a slightly higher temperature, leaving a residue which gives a fine, reddish-violet coloration with ferric chloride. The platinochloride forms anhydrous, yellow prisms, whilst the chloride crystallizes with 1 molecule of water. *Cyanacetophenocoll*, *phenocolloxamic acid*, and several derivatives of "paramidophenetoil" and of "anisidine"

are also described in this paper, which should be consulted for details.

Note on Carbolic Acid. G. Coull. (*Pharm. Journ.*, 3rd series, xxv. 532, 533.) The author shows that carbolic acid may be obtained commercially, at a moderate price, in a condition of purity far in advance of what the British Pharmacopœia demands. He therefore suggests that the official standard be raised by requiring that the melting point be not lower than 38.8°C ., and that the boiling point be not higher than 182°C ., the bulb of the thermometer being immersed in the acid.

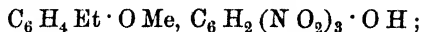
Preservation of Carbolic Acid. W. von Hankó. (*Chem. Zeitung*, 1895, 1143.) The author recommends that carbolic acid be kept in vessels made of aluminium, or better still of tin, which prevent the oxidation which in the presence of other metals, light, certain ammonium compounds, etc., is brought about by atmospheric oxygen, and is the cause of the red coloration of the acid. Stannous chloride is recommended by him as a reagent for detecting the oxidation product causing this coloration. Reddened carbolic acid, when treated with this reagent, turns emerald green. Frequent melting of carbolic acid kept under ordinary conditions greatly increases its tendency to redden, owing to the repeated exposure to the air. This change can be prevented or retarded by adding to the fused acid a small quantity of powdered stannous chloride, and keeping it in small, suitable vessels, such as suggested above.

Preparation of Benzoic Anhydride. A. Deninger. (*Journ. prakt. Chem.* [2], l. 479, 480.) When pyridine is added to a mixture of benzoic chloride with dry sodium carbonate, a very energetic action takes place, resulting in the formation of benzoic anhydride. The oxides of mercury, copper, lead, and zinc produce a similar action, and in the case of the last named of these the addition of pyridine is unnecessary.

Occurrence of Salol in Salicylic Acid. (*Zeitschr. des oesterr. Apoth. Ver.*, July 10th, 1895, from *Rep. de Pharm.*) In consequence of imperfectly conducted distillation, some commercial samples of salicylic acid are contaminated with salol. The acid containing this impurity, when treated with solution of sodium carbonate, yields a turbid mixture. After being kept for some length of time in a bottle well corked or stoppered, it often betrays the odour of salol on removing the stopper.

Compound of Picric Acid with Anethoil. G. Ampola. (*Gazzetta Chim. Ital.*, xxiv. i. 432, 433; *Journ. Chem. Soc.*, November, 1894.)

Picric acid and anethoil combine in alcoholic solution to form an additive compound—



which crystallizes in fine red needles, fusing at 60° , and resembling the picrates of the naphthalene hydrocarbons in properties.

Beechwood and Oakwood Creosotes. A. Béhal and E. Choay. (*Comptes Rendus*, cxviii. 1339–1342; and cxix. 166–169.) “Official creosote,” consisting of the creosote constituents boiling between 200° and 220° C., is generally supposed to contain a very large percentage of guaiacol, along with some cresol and a small proportion of monophenols, guaiacol being by far the predominating constituent. This view appears to be no longer tenable, since the authors’ results show the following percentage composition:—

	Beechwood Creosote.	Oakwood Creosote.
Monophenols	39	55
Guaiacol	19.72	14
Cresol and its homologues . .	39.98	31

Even after fractionating, and collecting only what passes over between 210 and 220, beechwood creosote contains but 26.48 per cent. of guaiacol, associated with 39 of monophenols, and 32.14 of cresol and its homologues. Of the two, beechwood creosote thus contains decidedly the larger proportion of guaiacol; it also has a higher specific gravity than oakwood creosote, and is less caustic, owing to its smaller percentage of monophenols.

Synthesis of Anthracene. M. Delacre. (*Comptes Rendus*, 1895, 155–157; *Journ. Chem. Soc.*, 1895, 379.) The action of phenylic trichloracetate on benzene in presence of aluminium chloride yields an ethereal salt which is difficult to isolate, but which, when distilled, splits up into carbonic anhydride and anthracene, about 9 grams of the latter being obtained from 20 grams of phenylic trichloracetate.

Ilicene. A. Schneegans and E. Bronnert. (*Archiv der Pharm.*, cccxxii. 532–539.) The name ilicene is given by the authors to a hydrocarbon of the formula $\text{C}_{35}\text{H}_{60}$, obtained from the bark, wood, and leaves of holly (*Ilex aquifolium*). It crystallizes from alcohol in colourless needles fusing at 182° – 183° C., and appears to be identical with a body described under the name of ilicic alcohol ($\text{C}_{25}\text{H}_{44}\text{O}$) by Personne. The authors also report on some of its derivatives and decomposition products.

Terpenes and Essential Oils. O. Wallach. (*Liebig's Annalen*, 1894, cclxxxi. 127–166. From *Journ. Chem. Soc.*) When limonene

tetrabromide is warmed on the water-bath with a solution of sodium in methylic alcohol, a *compound* is obtained which has the constitution $C_{10}H_{14}Br \cdot OMe$; it boils at 137° – 140° (14 mm.); the sp. gr. = 1.251 at 18° , and $n_D = 1.51963$ at the same temperature. When treated with hydrogen bromide in glacial acetic acid, it yields dipentene tetrabromide, and the action of sodium ethoxide gives rise to *carveol methyl ether*, $C_{10}H_{15} \cdot OMe$, an oil of pleasant odour, which boils at 210° – 212° , has a sp. gr. = 0.9065 at 18° , and a specific refractive index $n_D = 1.47586$ at this temperature. On oxidation with chromic anhydride in glacial acetic acid solution, carveol methyl ether yields carvone, the transformation of limonene into carvone being thus effected. Terpeneol also may be converted into carvone in a similar manner, since the tetrabromide yields carveol methyl ether by the action of sodium methoxide. Cymene is formed when terpeneol tribromide is boiled with alcoholic potassium cyanide.

The author cannot confirm his former conclusion, that the dipentene dihydriodides described by him correspond with v. Baeyer's dihydrobromides and dihydrochlorides. The sole product of the action of phosphorus triiodide on terpin hydrate is the hydriodide, $C_{10}H_{18}I_2$, which melts at 70° .

Pinol dibromide is converted into cymene by energetic reducing agents, such as formic acid or zinc dust and glacial acetic acid; the latter also gives rise to the diacetate of pinol glycol when boiled, whilst under other conditions solid terpeneol is formed.

Pinol tribromide, $C_{10}H_{17}OBr_3$, is most conveniently prepared by treating pinol dibromide with hydrogen bromide in glacial acetic acid. When reduced in alcoholic solution with sodium, it yields a *compound* which boils at 225° ; the *oxime* melts at 82° – 83° . If reduction is effected by means of zinc dust and glacial acetic acid, an unsaturated *ketone*, $C_{10}H_{16}O$, is formed, boiling at 213° – 218° ; the *secondary alcohol*, $C_{10}H_{18}O$, derived from this substance, boils at 218° – 220° , and has the specific rotatory power $n_D = 1.47096$ at 21° , and the sp. gr. = 0.91 at the same temperature. The alcohol is very viscous, and has a pleasant odour resembling that of linalool and terpeneol; the ketone is regenerated from it by oxidation.

The author discusses the constitution of pinol, representing it by the formula $CH \left\langle \begin{array}{c} CMe \cdot CH \\ CH_2 \cdot CPr \end{array} \right\rangle CH_2$.

Oil of Pelargonium from Réunion. P. Barbier and L. Bouveault. (*Comptes Rendus*, cxix. 281–284 and 334–337.) This oil is found to contain six different constituents, the predominating

one of which is the rhodinol-like alcohol, which the authors provisionally call *pelargonium rhodinol*, and which differs from the lemonol of *Andropogon schænanthus* and from licarhodol in not readily losing water with formation of a terpene, and in not being attacked by hydrochloric acid in the cold. It is a colourless, oily liquid, with a strong odour of roses, boiling at 115° – 116° , under a pressure of 10 mm., having a specific gravity of 0.8866 at 0° , and a rotatory power of $-12^{\circ} 28'$ in a column 20 cm. long. Its hydrochloride, when heated with potassium acetate, yields rhodinol acetate, whereas the hydrochlorides of its isomerides (lemonol and licarhodol) yield a terpene. An acetate, an aldehyde, and two acid oxidation products are described, and a description is also given of some of the minor constituents of the oil, one of which resembles licareol.

Reuniol. A. Hesse. (*Journ. prakt. Chem.*, 1894 [2], 1. 472–479. From *Journ. Chem. Soc.*) Oil of geranium, from the island of Réunion, contains a terpene-alcohol which is different from geraniol. It may be obtained by heating the oil with alcoholic potash at 100° , to decompose the ethereal salts which it contains, and then etherifying the alcoholic constituents by heating with camphoric anhydride. The non-alcoholic substances present may then be removed by distillation with steam, and the alcoholic constituents thus left in a state of greater purity. Reuniol obtained in this way boils at 225.5° – 226° , has a specific gravity of 0.865 at 20° , and a composition corresponding to the formula $C_{10}H_{18}O$. Its rotatory power is $1^{\circ} 45'$ (100 mm. tube). The acetate boils at 124° – 125° (17 mm.), and has a specific gravity of 0.899 at 20° . Reuniol does not appear to form a definite compound with calcium chloride, and can thus be separated from geraniol. It has been detected in geranium oil from many sources, the French, African, and Spanish oils all being found to contain it. A substance possessing very similar properties has been described by Barbier, who, however, does not seem to have obtained it free from non-alcoholic impurities.

Tanacetone and its relation to Thujone. F. W. Semmler. (*Ber. der deutsch. chem. Ges.*, xxvii. 895–898.) Tanacetone and absinthone, which the author believes to be identical, combine with sodium bisulphite, and yield solid oximes; whereas thujone and salvone do not, and they also differ from tanacetone in physical properties. Two derivatives of tanacetone are described, one of which, *carvotanacetone*, closely resembles carvone in its odour, while the other, *tetrahydrocarvotanacetone*, has an odour like

that of terpineol, and possesses properties resembling those of hexahydro-oxy-cymene, obtained from terpineol by Wallach.

The Carvone Series. O. Wallach and H. Schrader. (*Liebig's Annalen*, cclxxix. 366-390.) In this paper the authors deal with derivatives of carvoxime and with reduction products of carvone. For details respecting these bodies the reader is referred to the original. It may here be mentioned, however, that one of the reactions described confirms the close relation existing between the isomeric compounds, dihydrocarvone and thujone; and also that from one of the fractions of thuja oil the authors have obtained a body which may prove identical with the carvotanacetone obtained by Semmler (preceding abstract).

Oxidation Products of Carvol. O. Wallach. (*Ber. der deutsch. chem. Ges.*, xxvii. 1495, 1496.) The author has continued his researches on these products, and now states that the acid of higher melting point, when purified by recrystallization, fuses at 192.5° C. (not at 185° as previously stated). Its composition is represented by the formula $C_8H_{12}O_5$. When distilled under diminished pressure this acid is converted into a neutral substance of the formula $C_8H_{10}O_4$ (previously given as $C_{10}H_{12}O_5$), fusing at 129° . The acid described as melting at about 100° has also been obtained in a pure condition, in which it fuses at 94° - 95° . It is isomeric with terpenylic acid, $C_8H_{12}O_4$, is a well-marked bibasic acid, and forms a *silver* salt, $C_8H_{10}O_4Ag_2$.

Linalolene. F. W. Semmler. (*Ber. der deutsch. chem. Ges.*, xxvii. 2520, 2521.) When linalöl is reduced with sodium and absolute alcohol, or when it is heated with zinc dust in a sealed tube at 220° - 230° , it yields *linalolene*, $C_{10}H_{18}$, which boils at 165° - 168° , has a specific gravity of 0.7882 at 20° C., and a specific refractive power of $n_D = 1.455$.

Constitution of Licareol. P. Barbier and L. Bouveault. (*Comptes Rendus*, cxviii. 1208-1211.) When licareol is gradually mixed with sufficient chromic acid mixture to yield 2 atoms of oxygen for each molecule of the alcohol, it yields acetone, licaraldehyde or licarhodol, a methyl heptylene ketone, acetic and formic acids, and methylheptyleneketonecarboxylic acid. With an excess of boiling chromic acid mixture, the products are formic and acetic acids and terebic acid.

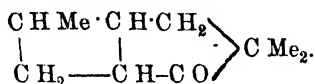
The licaraldehyde boils at 111° - 112° under a pressure of about 13 mm., and yields an oxime boiling at about 145° under a pressure of 12 mm., which in its turn yields licareonitrile, boiling at 110° - 111° under a pressure of 13 mm. It yields with paramido-

phenol a crystalline compound, $C_{10}H_{16}N \cdot C_6H_4 \cdot OH$. When boiled with glacial acetic acid, it yields paracymene.

The methyl heptylene ketone is identical in all its properties with the natural product.

The formation of terebic acid indicates that the constitution of licareol is more probably $CMe_2 \cdot CH \cdot CH_2 \cdot CH (CH_2 \cdot OH) \cdot CMe \cdot CH_2$ than that previously ascribed to it. Licareol and lemonol (geraniol) yield practically the same products on oxidation, and the only reasons for supposing that they have different constitutions are that the former is optically active whilst the latter is inactive, and the two aldehydes yield, with paramidophenol, compounds which have different melting points. It is possible, although not probable, that lemonol is a racemic compound.

Fenchone. O. Wallach. (*Liebig's Annalen*, 1895, 324-345.) The author discusses the behaviour of fenchone and its derivatives, and expresses its constitution by the formula—



A direct comparison of metacymene obtained by the action of phosphoric anhydride on fenchone with metacymene isolated from resin oil, shows that these hydrocarbons are identical.

Citronellal. O. G. Doebner. (*Archiv der Pharm.*, ccxxxii. 688-691.) Citronellal, $C_{10}H_{18}O$, as well as citral, $C_{10}H_{16}O$, has been obtained by the author from citron oil. The separation of these two substances, their properties, and some of their derivatives are described in the paper.

Constitution of Camphor. J. Brecht. (*Ber. der deutsch. chem. Ges.*, xxvii. 2092-2099; *Journ. Chem. Soc.*, December, 1894.) It is well known that when camphor is oxidised, the product consists, to the extent of about two-thirds, of camphoric and camphoronic acids. The author has now shown that the remainder contains oxalic, dimethylmalonic, succinic, and trimethylsuccinic acids; the method adopted was to convert the mixture of acids into a mixture of their ethylic salts, and to fractionate this under diminished pressure. The formation of these acids is further evidence in favour of the formula for camphor previously suggested by the author.

Derivatives of Campholic Acid. M. Guerbet. (*Bull. de la Soc. Chim.* [3], xi. 610-618.) The author describes *campholic anhydride*, $(C_{10}H_{17}O)_2O$, *campholic cyanide*, $C_{10}H_{17}O \cdot CN$, di-

campholyl, $C_{10}H_{17}O \cdot C_{10}H_{17}O$, and *dicampholylic alcohol*, $C_{10}H_{17}O \cdot C_{10}H_{18} \cdot OH$. For details the original should be referred to.

Isocampholic Acid. C. Friedel. (*Pharm. Journ.*, from *Comptes Rendus*, cxix. 278.) This acid has the same composition as campholic acid— $C_{10}H_{18}O_2$. It is found in the residue left on preparing the latter, and is a colourless oily liquid with a disagreeable odour, recalling that of valerianic acid. It boils at 180° – 181° , has a density at 0° of 0.9941, and its rotatory power is $[\alpha]_D = +24^{\circ}38'$. The acid is almost insoluble in water, but it mixes with alcohol and ether, and its salts crystallize readily from any of these liquids.

Conversion of Hemipinic Acid into Veratric Acid. C. Kühn. (*Ber. der deutsch. chem. Ges.*, 1895, 809–811.) When hemipinimide is treated with alkaline sodium hypochlorite, *amidoveratric acid* (dimethoxyanthranilic acid) is formed, which on treatment with an alcoholic solution of amyl nitrite and sulphuric acid is converted into veratric acid.

Hydrogen Peroxide in Green Plants. A. Bach. (*Comptes Rendus*, cxix. 1218.) The reagent employed by the author is a solution of 0.03 gram of potassium bichromate and 5 drops of aniline in a litre of water. 5 c.c. of the solution to be tested are mixed with an equal quantity of the reagent, and then with 1 drop of a 5 per cent. oxalic acid solution. In the presence of hydrogen peroxide a reddish-violet coloration is produced. In order to apply this test to the leaves of plants, they are extracted with a 1 per cent. solution of oxalic acid, and the resulting solution is then tested as stated. Eighteen out of twenty-five species of plants thus examined gave distinct indications of the presence of hydrogen peroxide.

Diastatic Ferment in Plants. J. Grüss. (*Jahrbuch für wissenschaft. Bot.*, 1894, 379–437; *Pharm Journ.*, 3rd series, xxv. 626.) From experiments on seedlings of *Canna*, *Platanus*, *Phaseolus*, *Begonia*, etc., the author infers the existence in seedlings of a soluble diastase which is capable of diffusion through the cell-wall, and appears to pass, along with maltose, out of the cotyledons into the stem.

Presence of Soluble Pectase in Acid Fruits. MM. Bertrand and Mallèvre. (*Comptes Rendus*, cxx. 110.) Pectase is shown to exist in solution in the cell-sap of acid fruits. Its presence as an active ferment in the juice of such fruits cannot, however, be recognised without previous neutralization of the free acid.

Proteïds of Wheat. T. B. Osborne and M. Voorhees. (*Journ. Amer. Chem. Soc.*, xvi. 524.) The authors have separated five distinct proteïds from wheat kernels, viz., gliadin, glutenin, edestin (a globulin), leucosin (an albumin), and a proteose besides a proteose-like body. A description of these constituents will be found in the paper.

Proteïds of the Kidney Bean. T. B. Osborne. (*Journ. Amer. Chem. Soc.*, xvi. 633, 703, and 757.) The author has isolated from the kidney bean (*Phaseolus vulgaris*) two distinct globulins—*phaseolin* and *phaselin*—which are characterised by great solubility in dilute saline solutions, and by forming precipitates with acids, which are readily soluble in solution of sodium chloride. Besides these, the presence of traces of a proteose has been observed.

Vegetable Proteïds. W. Palladin. (*Zeitschr. Biol.*, xxxi. 191–202. From *Journ. Chem. Soc.*) An examination of the various vegetable proteïds described by Weyl, Vines, Martin, Green, Chittenden, Osborne, and others, leads the author to the following general conclusions:—

1. Plant-vitellin has many of the properties of albumoses.
2. Plant-myosin is only a calcium compound of vitellin.
3. The existence of vegetable albumoses soluble in water is questionable.
4. Vegetable proteïds are accompanied by a still unknown nitrogenous substance.
5. The number of hitherto described vegetable proteïds is greater than the number which really exist in the plants.

Nutritive Value of Cocoa. H. Cohn. (*Zeitschr. für physiol. Chem.*, xx. 1–27.) Experiments having for their object the determination of the nutritive value of cocoa were carried out with cacao beans containing 48–50 per cent. of fat and 10·8 per cent. of proteïd, as well as with commercial powdered cocoas containing 32–33 per cent. of fat, 13·8 of proteïd, and variable proportions of starch. It was found that the fat was well digested, while about one-half of the proteïd remained unused.

Influence of Chlorides on Nitrification. J. Crochetelle and J. Dumont. (*Comptes Rendus*, cxix. 93–96.) Potassium or sodium chloride, when added to a soil containing calcium carbonate, yields calcium chloride to the drainage water, which then has a retarding influence on nitrification. But if the calcium chloride thus formed be removed by washing, as during rainy weather, nitrification is distinctly promoted. Large quantities of alkaline chlorides, however, retard nitrification under any circumstances.

The effect of promoting nitrification just alluded to is not produced in soils containing no calcium carbonate.

Influence of Oxygen on Alcoholic Fermentation. D. Iwanowsky. (*Bot. Centr.*, lviii. 344.) Also N. v. Chudiakow. (*Landw. Jahrb.*, xxiii. 391.) In the first of these papers it is shown that the fermentative energy of yeast cells is not influenced by oxygen, and that no amount of aëration will enable the cells to respire like aërobic organisms.

N. v. Chudiakow shows that in pure sugar solutions fermentation is much more vigorous in the absence of oxygen than in its presence. The better the nutritive solution, the less is the unfavourable effect of oxygen, until, with worts and peptone, oxygen has no effect at all. For the multiplication of yeast cells, oxygen is necessary when the nutritive solution is poor, but it is almost unnecessary when sugar-peptone solution and worts are employed. The activity of yeast as ferment rises with the temperature, and does not depend upon the presence or absence of oxygen. The cells are killed, however, when the temperature rises to or above 45°.

Composition of Pure Yeast. P. Guichard. (*Bull. de la Soc. Chim.* [3], xi. 230-239.) When recently pressed pure yeast is dried over sulphuric acid or calcium chloride, it loses about 72 per cent. of water. The dried residue contains 1.4 per cent. of fat, which can be extracted from it with petroleum ether, and yields 6.7-7.2 per cent. of ash. The specific gravity of pure yeast cells at 16° C. is about 1.18.

Action of Fluorides on Ferments. J. Effront. (*Comptes Rendus*, cxix. 169.) The author has extended his experiments on the action of fluorides on beer yeasts to a study of their influence on the fermentative processes induced by the lactic, butyric, and acetic ferments. Here, too, secondary products are formed in addition to those usually obtained in these fermentations. The energy of the fermentations is increased, while the reproduction of the ferments is lessened.

Cause of the Yellow Coloration of Milk on Exposure to Heat. P. Cazeneuve and M. Haddon. (*Comptes Rendus*, June 10th, 1895.) This yellow coloration is attributed by the authors to the oxidation of the lactose in presence of the alkaline salts of the milk. The acid products formed in this oxidation explain the coagulation of milk, and the casein thus coagulated is tinged yellow by brown substances formed at the expense of lactose.

Casein of Human Milk. A. Wroblewski. (*Inaugural Dissertation, Bern, 1894.*) Casein from human milk is found to differ from that of cow's milk in solubility, and in the fact that on peptic digestion it yields no residue of nuclein.

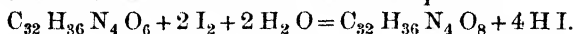
Fatty Acids of Human Milk. W. G. Ruppel. (*Zeit. Biol.*, xxxi. 1-11.) Also E. Laves. (*Zeitschr. für physiol. Chem.*, xix. 369-377.) Ruppel finds the fatty acids in human milk to consist of butyric, caproic, capric, myristic, palmitic, stearic, and oleic acids. The proportion of volatile acids is stated to be very small.

E. Laves gives quantitative results, showing the presence of 1.4 per cent. of volatile acids, 1.9 of acids soluble in water, and 49.4 per cent. of unsaturated acids. The volatile acids consist of about equal proportions of caproic, caprylic, and capric acids, and small quantities of butyric acid.

The chief acids present in human milk are palmitic, stearic, oleic, and myristic acids. The melting point of the fat is 30°-31°, and that of the fatty acids 37°-39°.

Crystalline Acids of Human Bile. M. Lassar-Cohn. (*Ber. der deutsch. chem. Ges.*, xxvii. 1339-1346.) After boiling the bile with solution of potassium hydrate for 24 hours, it yielded cholic acid, $C_{24}H_{40}O_5$, choleic acid, $C_{24}H_{40}O_4$, and *fellinic* acid, $C_{23}H_{38}O_4$, besides fatty acids and uncrystallizable resin. Fellinic acid, which is homologous with choleic acid and distinct from Schotten's fellenic acid, has not been observed in ox-bile.

Bile Pigments. A. Jolles. (*Pflüger's Archiv*, lvii. 1-57.) Pure bilirubin is slowly but completely converted into biliverdin by the action of a weak (centinormal) alcoholic solution of iodine. The reaction occurs in accordance with the equation—



The conversion occurs more rapidly when Hübl's iodine solution of the same strength is used. On the basis of this reaction the author suggests a volumetric process for the estimation of bilirubin, in which centinormal alcoholic iodine solution, centinormal solution of sodium hyposulphite, and mucilage of starch are employed. The characteristic colour and spectrum of biliverdin are not seen until the conversion of the bilirubin into biliverdin is complete.

Ox-bile contains from 0.024 to 0.027 of bilirubin, a much smaller proportion of biliverdin, and mere traces of free acid and saponifiable substances. Pig's bile is more viscid and rather more acid than ox-bile, is richer in urobilin, and contains from 0.051 to 0.206 per cent. of bilirubin, and also a red pigment

soluble in amyl alcohol. The proportion of saponifiable substances is small, but relatively greater than in ox-bile. Dog's bile and human bile are also slightly acid. The latter contains 0.154 to 0.262 per cent. of bilirubin, and its acidity and proportion of saponifiable matter appear to be greater than those in the bile of lower animals.

Cholic Acid. K. Landsteiner. (*Zeitschr. für physiol. Chem.*, xix. 285-288.) The author has studied substitution derivatives of cholic and bilianic acids with bromine. The chief product described by him is *bromodehydrocholic acid*, $C_{24}H_{33}BrO_5$, obtained by the bromination of dehydrocholic acid in acetic acid solution. For details the original should be consulted.

When acted upon by fuming nitric acid at $0^{\circ}C$., cholic acid is converted into dehydrocholic acid.

The Blue Iodide of Cholic Acid. F. W. Küster. (*Zeitschr. physikal. Chem.*, 1895, 156-163.) The author arrives at the conclusion that the blue compound of iodine and cholic acid is neither a solid solution nor a true chemical compound, but a crystal structure analogous to that which the acid forms with water, alcohol, etc.

Iodine Compounds of Starch and Cholic Acid. F. Mylius. (*Ber. der deutsch. chem. Ges.*, xxviii. 385-390.) In addition to the blue combinations of iodine and cholic acid, which the author regards as compounds of iodine with the hydriodide, etc., of the acid, it is shown that there exists a brown crystallized product of the formula $C_{24}H_{40}O_5I_2$, which he considers to be a true iodine compound of cholic acid. The brown compound is obtained by dissolving equal molecular weights of cholic acid and iodine in alcohol, and diluting the solution with water. Hydriodic acid, potassium iodide, or reducing agents, convert it into the blue compound. The latter, on the other hand, is converted into the brown iodide by treating it with strong solution of iodine. Starch, under analogous conditions, is also capable of forming a brown compound with iodine.

The Composition of Cholesterol. J. Mauthner and W. Suida. (*Monatshefte*, xv. 362-374.) The authors publish a large number of analytical results obtained by them with cholesterol and its derivatives, and arrive at the conclusion that the formula correctly representing the composition of cholesterol is $C_{27}H_{44}O$.

Carnic Acid. M. A. Siegfried. (*Ber. der deutsch. chem. Ges.*, xxvii. 2762, 2763; and xxviii. 515-519.) This monobasic acid, the

composition of which is represented by the formula $C_{10}H_{15}N_3O_5$, appears to be identical with antipeptone, and has been observed among the products of tryptic digestion. It is contained in muscle in combination with phosphoric acid as *phosphorcarnic acid*, which is easily separated by means of its iron compound, "carniferrin." Phosphorcarnic acid is split up into phosphoric acid and carnic acid by the action of baryta water. Several salts of carnic acid are described.

Fat Secretion from the Sweat-Glands. P. G. Unna. (*Brit. Journ. Dermatology*, vi. 257.) The author shows that the ordinary sweat-glands in man secrete fat which differs in its physical properties from that of the sebaceous glands in a manner similar to that in which stearin differs from olein.

Relation between Food and the Formation of Fat. G. Kühn. (*Landw. Versuchs-Stat.*, xliv. 257.) The author's results confirm the view that any increase of food over the smallest quantity actually required to maintain the body in equilibrium gives rise to a production of fat, no matter whether the excess of food is nitrogenous or non-nitrogenous.

Digestion of Nitrogenous Food Constituents by Treatment with Gastric Juice and Pancreas Extracts. G. Kühn and others. (*Landw. Versuchs-Stat.*, xliv. 188-256. From *Journ. Chem. Soc.*) Stutzer's method for determining digestibility consisted in subjecting the substance to the action of 250 c.c. of a pepsin solution (*Journ. f. Landw.*, 1880, xxviii. 195 and 435) for 24 hours. Experiments were instituted by the authors to ascertain the effect, if any, of varying the amount of pepsin, the duration of the action, and the amount of acid. For some foods it was found that for every two grams, 500 c.c. of pepsin solution, to which hydrochloric acid is gradually added to the extent of 1 per cent. (as recommended by Stutzer), should be employed, and that the action should be continued for at least 48 hours. With most foods, as the residues of fennel, anise, caraway seeds, etc., the action must be prolonged to 72 or even 84 hours. Foods not hitherto examined should be first tested in order to ascertain whether 48 hours is sufficient.

Pfeiffer (*Journ. f. Landw.*, xxxi., 1883, 221), in experimenting with sheep, found that they digested more nitrogenous matter than Stutzer's method indicated, and proposed the employment of pancreas solution after pepsin (*Zeit. physiol. Chem.*, 1885, ix. 211). He found that 20-30 per cent. more nitrogenous matter was

digested, and that the results then approximated more closely to those obtained with live animals. Stutzer concluded that the two solvents dissolved different nitrogenous substances.

Inasmuch as it is now shown that the 24-hour treatment with pepsin solution was insufficient, and as Stutzer himself showed that a pancreas extract alone had not a greater solvent power than pepsin, it seemed possible that the action of pancreas solution on a substance already treated with pepsin might be due to the alkali employed. This is now shown to be the case by comparative experiments. With hay, linseed cake, and cotton cake, there was generally less undissolved nitrogenous matter after treatment with soda than with pancreas, and in every case both the pancreas and the soda dissolved nitrogenous matter left undissolved by pepsin. In the case of ethereal oil residues the pancreas dissolved considerably more than the soda; this is due to the resinous matters they contain, which are first attacked by soda and then digested by the pancreas.

When the new method (more prolonged treatment with pepsin) was compared with Stutzer's method (successive treatment with pepsin and pancreas), it was found that in twelve experiments eight gave higher results (undissolved substances) with Stutzer's method, and four with Kühn's method.

It is concluded that pepsin solutions will dissolve all the really digestible nitrogenous matter of foods, unless, as in the case of umbelliferous seeds, there is some hindrance. Treatment with pancreas is unnecessary, and the use of soda which it involves is unsafe.

The results of twenty-two feeding experiments with bullocks show the correctness of this view, and that the nitrogenous matter of food which is not attacked by pepsin is completely separated in the intestines. In artificial digestion, any further amount dissolved by pancreas, after treatment with pepsin, is due to the action of the soda.

The analytical results are given in tables, showing the amount of pepsin solution employed and the duration of the experiments, etc.

The experiments were made in 1882-92.

Leucine as a Product of Pancreatic Digestion. R. Cohn. (*Zeitschr. für physiol. Chem.*, 1894, xx. 203-209.) The author supplies evidence showing that the leucine obtained in the pancreatic digestion of proteids is not a single substance, but a mixture of several isomeric bodies.

Peptic Digestion. F. Klug. (*Pflüger's Archiv*, 1895, 43-70.) The following are the results of this investigation:—Successive extracts of the same mucous membrane possess different activities, the later being more active than the earlier ones. The activity of the first extract is, however, increased by dilution with weak hydrochloric acid, or by allowing it to digest itself for 24 hours. For experiments on artificial digestion, boiled white of egg is recommended as the best; this, however, already contains about 0·7 per cent. of deutero-albumose. Ammonium sulphate and sodium chloride retard the course of the digestion: the latter, if present to a greater extent than 0·5 per cent.

The quantity of pepsin has an important influence; the best is from 0·5 to 0·01 per cent. of the pepsin solution. With greater or less concentrations, the activity lessens; still, digestion does occur with a pepsin percentage of 0·005. Dog's pepsin, with a concentration of 0·01 per cent., is more active than pig's or ox pepsin similarly diluted; the best percentage for these two is 0·1.

The most suitable percentage of hydrochloric acid is 0·5 to 0·6. Gastric juice with less than 0·1 per cent. of hydrochloric acid does not act on white of egg. The best artificial juice therefore contains 0·1 per cent. of pepsin and 0·6 per cent. of hydrochloric acid. Twenty c.c. of such a juice will dissolve 6 grams of hard-boiled white of egg within 10-15 hours. Digestion proceeds most rapidly in the first four hours. Syntonin and albumoses appear five minutes after the commencement of the digestion. Peptone makes its appearance with dog's pepsin in 20-40 minutes, with the pepsin of ox and pig in four hours. Dog's pepsin also forms more peptone in the same time than the other pepsin. It is even suggested that different pepsins exist.

Digestion ceases at 0°; it increases with the temperature, reaching its maximum between 50° and 60°; it then becomes less active, and ceases entirely at 80°. Syntonin and albumoses appear simultaneously; syntonin, however, is not regarded merely as a product of the hydrochloric acid, but, like albumoses and peptone, is the result of the activity of pepsin hydrochloric acid. The paper is illustrated by charts and tables. In the estimation of peptone, the spectrophotometer applied to the biuret reaction was found to give good results.

The Pharmacopœia Process for the Assay of Pepsin. C. D. Moffat. (*Pharm. Journ.*, 3rd series, xxv. 813-815.) The author recommends the adoption of the following modifications in the official method of testing pepsin:—

1. The standard should be raised from 1 : 50 to 1 : 250. From an examination of several makes of pepsin now in the market, it is evident that no difficulty will be found in procuring a pepsin which, under the B.P. conditions of time and temperature, will dissolve 250 times its weight of albumin.

2. There should be a definite interval of five minutes between the agitations. If the albumin be in a properly divided state to start with, shaking is preferable to stirring, since there is always some liability to breakage with the latter.

3. The albumin should be passed through the sieve twice. It will then be in the most favourable condition for the pepsin to exercise its solvent powers.

The other directions as to proportion of acid, albumin, water, time, and temperature should remain unaltered.

Peptone Salts of Egg-Albumin. C. Paal. (*Journ. Chem. Soc.*, November, 1894, from *Ber. der deutsch. chem. Ges.*, xxvii. 1827-1851.) A number of peptone hydrochlorides have been prepared by the action of hydrochloric acid on egg-albumin under varying conditions of concentration, temperature, etc., fully described by the author. These salts are colourless, or pale-yellow, brittle, and amorphous, and are almost as hygroscopic as phosphoric anhydride; the latter property increases with the amount of combined acid. They are miscible with water in all proportions, dissolve readily in glacial acetic acid, more sparingly in phenol, and their solubility in the alcohols varies inversely with the molecular weight of the solvent, resembling the corresponding salts of the glutin-peptones in this respect. These compounds are not altered at 130°, have a sour, cheesy flavour, with a bitter after-taste; they give the biuret, xanthoprotein, and Millon's reactions, are incompletely precipitated from aqueous solution by phosphotungstic acid, and, in contrast to the glutin-peptone salts, yield soluble double salts with mercuric chloride. That they are true peptones is shown by the fact that little or no precipitate is produced with ammonium sulphate or sodium chloride, and the subsequent addition of an acid or alkali causes no change. Although the salts in aqueous solution redden litmus paper, no free acid is present, as repeated evaporation of the liquid causes no change in the composition of the peptone. The chlorine is only partially removed by the addition of silver nitrate. Certain of the salts were found to yield small quantities of methyl- and ethyl-derivatives by treatment with the respective alcohols. In the salts of the albumin-peptones, as in those of the glutin-peptones, the

quantity of acid present is in inverse proportion to the molecular weight.

The *free peptones* are prepared from the hydrochlorides by the action of silver sulphate in the manner previously described; the yield is 70–80 per cent. of the theoretical. They give the usual peptone reactions, are less hygroscopic than the salts, are sparingly soluble in methylic alcohol, and almost insoluble in ethylic alcohol. The *barium salts* are colourless and pulverulent, readily soluble in water, and somewhat hygroscopic. Zinc and copper salts produce no precipitate in solutions of the barium salt; with ferrous sulphate, *ferrous peptonate* is obtained in solution, and gradually decomposes in presence of air into ferric hydroxide and peptone. *Silver peptonate* and *lead peptonate* are yellow, flocculent, insoluble precipitates, stable towards light. *Mercuric peptonate* is colourless, amorphous, and insoluble. Two *lead peptone sulphates* were also obtained; they are somewhat hygroscopic; the aqueous solution is pale, yellowish-brown, and is not decomposed by boiling.

Gastric juice converts albumin into peptones, and, as with hydrochloric acid, half the product consists of soluble (Hemi) peptones, half of insoluble (Anti) peptones; these were further separated by dialysis, and in their general properties they resemble those described above.

A sample of commercial "albumin peptone" was found to consist almost entirely of albumoses, one of which is probably identical with Schrötter's alcohol-soluble albumose.

Molecular weight determinations of the peptone salts and peptones by the cryoscopic and boiling-point methods show that, exactly as in the case of the gluten derivatives, the percentage of acid increases as the molecular weight becomes smaller, and, as the molecular weights indicated by the first method were only half those deduced from the second, it follows that in the albumin-peptones also, one molecule of peptone is combined with one of hydrochloric acid. The molecular weight of the free peptones is about 400. The author concludes that the hydrolysis of the proteids (peptonisation) can be followed, step by step, by the increasing proportions of acid, combined with the products characteristic of each phase of the reaction.

Proteids of the White of Egg. R. T. Hewlett. (*Proc. physiol. Soc.*, 1894, ix.) Fractional precipitation by ammonium sulphate, as well as fractional heat coagulation, and likewise separate precipitation with normal and with basic lead acetate, all indicate

the presence in the albumin of egg-white of one or more distinct proteïds, which are still under investigation. Coagulation of the albumins at much below the usual temperature, which Ramsden has effected by prolonged heating for days, necessitates the use of antiseptics, such as thymol, camphor, or the like; but their use is shown to involve a source of error, as the substances cause a slow precipitation of proteïds.

The "globulin" of egg-white appears to be identical with nucleo-albumin, and further experiments are in progress to test this supposition.

Ash-free Albumin. K. Bülow. (*Pflüger's Archiv*, lviii. 207-221.) Different proteïds varying in their properties yield the same invariable product by Harnack's method. It is insoluble in water, but forms soluble compounds with acids and alkalis. Neutral salts, even in small quantities, precipitate it from acid but not from alkaline solutions.

Albumone. R. Brunner. (*Inaug. Diss. Bern*, 1894.) The author shows that albumone, the proteïd prepared by Chabrié from the serum of human blood and obtainable also from ox blood, is formed during the process of heat coagulation partly from serum-albumin and partly from serum-globulin. It is therefore a product of change, and not a constituent pre-existing as such in the serum.

Contents of the Healthy Stomach. A. L. Gillespie. (*Rep. of Lab. R.C.P., Edinb.*, v. 43-50. From *Journ. Chem. Soc.*) The following conclusions are drawn from the examination of the contents of the healthy stomach:—(1) Free hydrochloric acid is secreted immediately the food enters; but this combines with proteïd, so that salivary action is not impeded during this first stage. The free acid does not appear in the stomach contents till from half an hour to two or three hours after the meal is taken; the time varies according to the composition of the meal. Hydrochloric acid combined with proteïd is less antiseptic than the free acid. The inorganic salts, especially the chlorides, and the total proteïds per cent. in solution fall during the progress of digestion. Albumin increases, albumoses remain stationary, and peptone diminishes.

Physiological text-books are stated to be in error concerning the amount of acid; the following numbers are derived from the present observations:—

Total acidity from . . .	0.108 to 0.36 per cent.
Combined acidity from . . .	0.072 „ 0.324 „
Free acidity from . . .	0.018 „ 0.09 „

The causes of variation are the time after the ingestion of a meal and the character of the food taken. The free hydrochloric acid is seldom over 0.09 per cent. after a proteid meal, but it may rise to 0.162 or 0.27 after a meal chiefly carbohydrate in nature.

Glucose. F. Röhm ann. (*Ber. der deutsch. chem. Ges.*, xvii. 3251-3253.) Blood-serum has previously been observed by the author, in conjunction with Bial, to contain enzymes possessing the power of transforming starch, dextrin, and maltose into glucose. He now publishes further results indicating that blood-serum as well as saliva, pancreatic juice, and intestinal juice contain both diastase (maltase) and glucose, the former being present in largest amount in the pancreas, and in the smallest in the blood, and *vice versa* as regards glucose.

Methæmoglobin and the Action of Acids on Hæmoglobin. J. A. Menzies. (*Journ. Physiol.*, 1895, xvii. 402-422.) Hæmoglobin is converted into methæmoglobin by exposure to air or by the action of many reagents, such as glycerin, potassium chlorate, permanganate, ferrieyanide and nitrite, sodium fluoride, iodine, and certain acids. Acetic, oxalic, phosphoric, hydrochloric, nitric, and sulphuric acids act on hæmoglobin, converting it first into methæmoglobin, then into hæmatin. Methæmoglobin cannot be distinguished from hæmatin by its spectrum alone, but only by the change produced by a reducing agent; it yields hæmoglobin on reduction, while hæmatin yields hæmochromogen.

Action of Zinc on Blood and Blood-pigment. E. Grahe. (*Chem. Centr.*, 1894, i. 636, 637.) Zinc-parahæmoglobin, obtained by Kobert by shaking blood with zinc dust, may also be obtained by the action of many zinc salts upon blood or solutions of crystalline blood-pigment. Its composition is represented by the formula $C_{758}H_{1139}Zn_2S_3FeO_{218}$. It is soluble in alkaline solutions, from which it can be precipitated by hydrochloric acid. It is readily absorbed into the system, and being non-poisonous is recommended as a remedy for chlorosis.

Cadaverine and Choline. W. Gulewitsch. (*Zeitschr. für physiol. Chem.*, xx. 287-305.) The author has obtained a quantity of these bases from putrid horseflesh, and has prepared and analysed some of their compounds and derivatives, which are fully described in the paper.

He also reports that Gram's statement concerning the ready conversion of choline into neurine by hydrochloric and lactic acids is incorrect, and thus confirms a statement to the same effect by E. Schmidt.

A Leucomaine obtained from the Urine of a Patient suffering from Angina Pectoris. A. B. Griffiths and C. Massey. (*Comptes Rendus*, May 20th, 1895.) The urine in question has yielded to the author a crystalline characteristic, highly toxic base not occurring in normal urine. Its composition is represented by the formula $C_{16}H_9NO_4$. A description of its reactions will be found in the paper.

Peptone in Urine. W. Robitschek. (*Chem. Centr.*, 1894, i. 780, from *Zeitschr. Klin. Med.*, xxiv. 542-604.) Peptone occurs in urine in many diseases, especially during suppuration. It has also been observed in cases of phosphorus poisoning.

The Carbohydrates of Natural Urine. K. Baisch. (*Zeitschr. für physiol. Chem.*, xx. 249-252.) The hitherto unidentified carbohydrate existing in urine in addition to *d*-glucose and animal gum is regarded by the author as probably isomaltose, a product of digestive processes, with which it agrees in most of its properties.

Hæmatoporphyrin in Normal Urine. A. E. Garrod. (*Journ. Physiol.*, xvii. 349-352.) The results recorded in this paper confirm the presence in healthy urine of small quantities of hæmatoporphyrin as a normal constituent. Further details for its isolation and recognition are described.

Uroerythrin. A. E. Garrod. (*Journ. Physiol.*, 1895, 439-450.) The nature of uroerythrin, the colouring matter imparting a pink tint to urate sediments, has never been satisfactorily determined. The present research shows that the colour of such sediments varies, owing to the fact that other pigments take part in the coloration. These other pigments are urochrome, hæmatoporphyrin, bile pigments and chrysophanic acid (found in the urine of patients taking rhubarb or senna). In support of the view that the uroerythrin in such cases is present in a state of combination, it is pointed out that the sediment always shows a definite absorption band on the blue side of the D line, when the deposit is examined on a filter paper by reflected light, or when the filter paper is dried, oiled, and then examined by transmitted light. Uroerythrin itself in solid form or in solution does not show this band. A new process for its extraction from urate sediments is described in the paper.

The author considers that clinical evidence points to the liver as the probable seat of formation of uroerythrin, but no definite clue has as yet been obtained indicating a relation to or derivation from the pigments of blood or bile.

Action of Iodine and Potassium Hydrate on Uric Acid.

E. Bryk. (*Monatshefte*, 1894, 519-529.) The author points out that Kreidl's method for the estimation of uric acid by treating it with iodine in the presence of potassium hydrate, and subsequently titrating with sodium hyposulphite, is based upon a reaction which is not of a definite nature, but varies with the proportions in which the three substances are used, and also with the temperature. Details will be found in the original paper.

Salts of Urea. C. Matignon. (*Bull. de la Soc. Chim.* [3], xi. 575, 576.) The author describes the *acetate*, *amidoacetate*, *hydrogen malonate*, and *glycollate* of carbamide. For details the original should be consulted.

Approximate Estimation of Albumin in Urine. M. Rössler. (*Apotheker Zeitung*, ix. 563.) The author obtains an approximate indication of the proportion of albumin in urine from the degree of cloudiness produced in the zone of contact on carefully placing the urine on the surface of acetic acid which has been previously mixed with a few drops of solution of potassium ferrocyanide.

Detection of Peptone in Urine. E. Salkowski. (*Chem. Centr.*, 1894, i. 658.) After removing any albumin that may be present, 50 c.c. of the urine to be tested are acidified with 5 c.c. of hydrochloric acid, then precipitated with phosphotungstic acid and warmed. The precipitate, which aggregates on standing, is collected on a filter, washed twice with water, and then mixed with 8 c.c. of water and 0.5 c.c. of solution of sodium hydrate, by which means a deep blue coloration is developed. By warming in a test-tube, this becomes a dirty greyish-yellow, and on the subsequent addition of a few drops of a 1 per cent. solution of copper sulphate it gives the usual biuret reaction.

Estimation of Iodine in Urine. H. Sandlund. (*Archiv der Pharm.*, ccxxxii. 183.) Fifty c.c. of urine are evaporated with 0.5 gram of sodium carbonate in a platinum dish; the residue is incinerated, the ash dissolved in water, the solution acidified with hydrochloric acid, and distilled with ferric chloride, the distillate being received in a solution of potassium iodide, and the iodine determined in the distillate by titration with sodium hyposulphite.

For the qualitative detection of iodine the author recommends the usual process of shaking the acidified urine with chloroform and a few drops of very weak solution of sodium nitrite.

Influence of Levulose on the Excretion of Sugar in Diabetes.

K. Bohland. (*Therap. Monatshefte*, viii. 377-381; *Chem. Centr.*, 1894, 890, 891.) The author has observed that in pronounced

cases of diabetes the administration of small doses of levulose may cause a very considerable increase in the quantity of sugar eliminated with the urine, greater than that corresponding to the dose of levulose.

Disturbing Influence of Sulphonal on Fehling's Test for Glucose. P. Lafon. (*Comptes Rendus*, cxx. 933.) The author points out that patients undergoing treatment with sulphonal often void a urine acting on Fehling's solution similar to saccharine urine, though the optical test shows the absence of glucose. In testing for the latter it is necessary, therefore, to take this point into consideration in order to avoid erroneous conclusions.

Detection of Sugar in Urine. Sir G. Johnson and G. S. Johnson. (*Pharm. Journ.*, 3rd series, xxv. 24-26 and 44, from the *Lancet*.) Pavy has shown that uric acid accounts for one-fourth of the reducing action of normal urine upon copper solution, and has suggested that the remainder of the reduction is due "to the small amount of sugar naturally present in the urine." The authors' results indicate that the remaining three-fourths of the reduction is due to creatinine, so that uric acid and creatinine together account for the whole of the reduction which is effected by urine upon copper solutions, and no trace of glucose is to be found in perfectly normal urine. Both uric acid and creatinine can be completely precipitated by mercuric chloride, and after removing the excess of mercury by ammonia, the filtrate is found to have no reducing power on copper solution or upon picric acid. That the separation of the creatinine by the mercuric chloride process does not remove any glucose that might be present is proved by the fact that when a known quantity of glucose is added to normal urine it is found undiminished after the removal of the creatinine. The mercury compound of creatinine obtained without heat contains one-fifth of its weight of the base, which is isomeric with, but differs from other creatinines in its properties, and is distinguished from them in the present paper as "natural creatinine of urine."

Picric acid, unlike copper solution, is not affected by uric acid, and may therefore serve for the estimation of creatinine in urine. This is done by comparing the colour resulting from the application of the test to the urine with that which results from testing an aqueous solution of creatinine of the same strength as that indicated to be present in the urine; but it must be borne in mind that the reducing power of creatinine is inferior to that of glucose in the proportion of 10 to 12, so that if the urine tested

with picric acid gives a colour which, if glucose were the reducing agent, would indicate 1 grain per ounce, the creatinine solution, to give the same colour, would have to contain 1.2 grain per fluid ounce. If the reduction by the urine were 0.8, then as 10 : 12 :: 0.8 : 0.96, the amount of creatinine would be 0.96 grain per ounce, and experiment confirms the result of the calculation. One point, however, has to be noticed. When the colours resulting from testing urine and an aqueous solution of creatinine of the same strength are compared, the former is usually seen to be very slightly darker. The difference, which is so small as to be incalculable in amount, is due to the colouring matter in the urine, which may be removed by filtering through animal charcoal before applying the test.

In order to apply the picric acid test for glucose without previously removing creatinine, etc., the following points are to be observed. When to a drachm of normal urine in a test-tube about half an inch in diameter is added an equal volume of a saturated solution of picric acid and half a drachm of liquor potassæ B.P., the mixture immediately becomes red, owing to the partial reduction of the picric acid by creatinine. Creatinine differs from glucose in the fact that in the presence of potash it exerts some reducing action on picric acid at the ordinary temperature of the air. When kept at the boiling point for a minute the colour is deepened, and in normal urine it may be such as to indicate what, if glucose were the reducing agent, would equal from 0.6 to 1.2 grain per fluid ounce, as shown by the micro-saccharometer. A solution of glucose, in the proportion of 2 grains to the fluid ounce of water, when tested as described, gives so dark a colour that no red light is visible through the middle of the column of liquid. If, therefore, a sample of urine having been thus tested, a bright red colour is transmitted through the full diameter of the test-tube when held up to the light, the reduction is due to creatinine alone, and no glucose is present. If, however, the colour is so dark as to indicate an amount of reduction equivalent to two or more grains of glucose, this is more than the largest proportion of creatinine hitherto found in any specimen of urine would account for, and the presence of sugar is indicated. The amount of sugar can be determined after separating the creatinine by the mercuric chloride process. This process, if it were intended to separate the natural creatinine unchanged by heat, would occupy about 48 hours; but the mere separation of creatinine for the purpose of the sugar test is effected in a short time by the following method:—

The urine is mixed with one-twentieth of its volume of a saturated solution of sodium acetate and nearly its own volume of saturated solution of mercuric chloride; the mixture is filtered, then boiled for five minutes and again filtered. The excess of mercury is removed by a small quantity of strong solution of ammonia, and the glucose, if any be present, estimated in the filtrate which is now free from other reducing agents. In the case of diabetic urine, when the amount of sugar is large, there is no need to take account of the small reduction due to creatinine.

In conclusion the authors mention that the urine of patients taking salicylate of soda reacts with picric acid and also with cupric solutions to the same extent as if it contained from 1 to 2 grains of glucose per ounce. This seems to be due to a decomposition product, since an aqueous solution of sodium salicylate has no such effect.

Further Proof of the Absence of Sugar in Normal Urine. Sir G. Johnson. (*Pharm. Journ.*, 3rd series, xxv. 603-605.) The author has ascertained that an aqueous solution of glucose ceases to give any coloration with picric acid and potash when the dilution is carried beyond 1 part in 10,000 of liquid, while in the case of a solution of urinary creatinine the limit of the reaction is not reached until the dilution is carried to the extent of 1 part in 200,000. If, therefore, the reduction-colour in normal urine were in part due to the presence of a small proportion of glucose, the colours resulting from the test of the urine and of an aqueous solution of creatinine of the same reducing power, which are equal when the two liquids are undiluted, would be unequal when the dilution is carried beyond the point of 1 part in 10,000. This fact, taken in conjunction with the previous observation (see preceding abstract) that the reducing action of creatinine upon picric acid and potash is less than that of glucose in the proportion of 10 to 12, forms the basis of a very simple test by means of which the author has further satisfied himself of the absence of sugar from urine as a normal constituent. Full details and examples are given in the paper.

The Cyano-Cupric Test for the Determination of Glucose. A. W. Gerrard. (*Pharm. Journ.*, 3rd series, xxv. 913.) The author has previously reported upon a new method for the estimation of grape sugar (*Year-Book of Pharmacy*, 1892, 400), and now suggests the following modification of the process then described:—

10 c.c. of Fehling's solution of the ordinary strength, or 5 c.c. each of the separately kept solutions of copper and alkali, are

placed in a porcelain dish with 40 c.c. of water, and then boiled. To the hot mixture add steadily from a pipette some 5 per cent. solution of potassium cyanide until the blue colour just fades, or a very faint blue colour only remains. Excess of cyanide must be carefully avoided. A second 10 c.c. of the Fehling's solution is now added, and whilst the mixture is kept boiling run in the solution of urine or sugar from a burette, until the blue colour is gone. It is important to keep the mixture well boiling, to add the urine steadily, and watch sharply for the change. The volume of fluid in c.c. used to remove the colour will contain .050 gram of glucose, so that if 10 c.c. be used the amount of sugar present is .5 per cent. Solutions containing above .5 per cent. of sugar should be diluted ten times before testing, and the resulting figures multiplied by ten.

The results are very satisfactory, even when the amount of sugar is very small. The process has an advantage over Pavy's, inasmuch as the boiling may be done in an open dish.

Gravimetric Estimation of Glucose. F. Gand. (*Comptes Rendus*, cxix. 478, 479.) In sugar estimations the destructive action of the alkali on the glucose (see page 35) somewhat impairs the accuracy of the results, and the author therefore suggests a gravimetric process in which 100 c.c. of a mixture of equal volumes of freshly made alkaline copper solution and water is boiled for a few minutes in a porcelain dish, which is then placed on a water-bath the water in which is boiling. 25 c.c. of the glucose solution containing about 1 per cent. are now added all at once, in order to make sure of the reduction taking place below 100° C., and thus preventing the destructive action of the alkali on the glucose above referred to. The reduction is complete in about ten minutes, after which the precipitate is washed with boiling water, then transferred to a small specific gravity bottle of known capacity, and the latter filled up to the mark with distilled water (previously boiled and cooled), and weighed. The weight of the precipitate is found by a calculation for which full details are given.

Volumetric Sugar Estimations. M. Samelson. (*Zeitschr. für angew. Chem.*, 1894, 267.) The author points out that the alkaline copper solution employed in these estimations should be properly standardised, instead of its correct strength being taken for granted, and thinks that if this were done, less would be heard of the superiority of gravimetric estimations than has recently been the case.

Estimation of Sugars by Fermentation. M. Lasché. (*Bied. Centr.*, xxiii. 551, 552.) The author points out that in carrying out investigations of this kind, it is necessary to know the properties of the various yeasts: that *Saccharomyces apiculatus* will only ferment sugars like dextrose; *Saccharomyces Joergenseii*, dextrose and saccharose; Saaaz yeast, dextrose, saccharose, and maltose; and that Frohnberg yeast decomposes all those sugars and isomaltose as well. *Saccharomyces Kephir* may be employed for the estimation of lactose.

Estimation of Cane Sugar in the Presence of Commercial Glucose. H. A. Weber and W. McPherson. (*Journ. Amer. Chem. Soc.*, 1895, 312-320.) The authors show that the error introduced into the cane-sugar estimation by the presence of dextrin in commercial glucose may be reduced to a minimum if the inversion of the cane sugar is effected by heating for ten minutes only, the temperature being gradually raised so as to reach 68° at the expiration of this time.

Detection of Cane Sugar in Sugar of Milk. A. Conrady. (*Zeitschr. des oesterr. Apoth. Ver.*, May, 1895. From *Journ. de Pharm.*) One gram of the milk sugar to be tested is dissolved in 10 c.c. of water; 0.1 gram of resorcin and 1 c.c. of concentrated hydrochloric acid are added, and the mixture is boiled for five minutes. If cane sugar be present, the liquid will assume a red colour.

Estimation of Starch. W. E. Stone. (*Journ. Amer. Chem. Soc.*, xvi. 726.) The author has critically compared the chief methods in use for the determination of starch, and finds them all satisfactory when applied to starch alone. But for the purpose of estimating starch in feeding stuffs, etc., he gives decided preference to the method based on the action of diastase.

Determination of Starch. P. L. Hibbard. (*Journ. Amer. Chem. Soc.*, xvii. 64.) The author describes a modification of the diastase process which is stated to be both expeditious and accurate. A full description of the *modus operandi* will be found in the paper.

Estimation of Starch in Compressed Yeast. F. Filsinger. (*Chem. Zeit.*, xviii. 742.) To an intimate mixture of 25 grams of the yeast with 250 c.c. of water an excess of solution of iodine in iodide of potassium is added, the whole well stirred and allowed to stand till the iodide of starch has settled down. As soon as this heavy compound has subsided, and before any appreciable quantity of the much lighter yeast is deposited, the milky liquid is drawn off by means of a siphon, and the iodide of starch

repeatedly washed by decantation. The latter is then collected on a weighed filter, dried at 105°C ., weighed, and 15 per cent. deducted from the net weight to allow for moisture usually present in commercial starch. The iodine volatilises during the heating of the precipitate.

Estimation of Hydrochloric Acid in Gastric Juice. J. J. Kasass. (*Chem. Centr.*, 1894, i. 481, from *Pharm. Zeitschr. für Russl.*) The author recommends a new process which is based on the liberation by hydrochloric acid, or gastric juice, of tartaric acid from acid potassium tartrate suspended in alcohol. 10 c.c. of the gastric juice are titrated with sodium hydrate. In the next place 12 c.c. of the juice are mixed with 6 c.c. of alcohol of 95 per cent. and an excess of acid potassium tartrate, the mixture being kept and occasionally shaken for an hour and then filtered. 15 c.c. of the filtrate (=10 c.c. of gastric juice) are then titrated as before. Finally a third titration is made on the lines of the second, water being used this time in the place of gastric juice, in order to make allowance for the slight solubility of acid potassium tartrate in the diluted alcohol. If a represents the result of the first, b that of the second, and c that of the third titration, the free hydrochloric acid will be equal to $[(b-c) - a] \times 3$.

Estimation of Glycocine. C. S. Fischer. (*Zeitschr. für physiol. Chem.*, xix. 164-178) It is recommended that albuminoids, like gelatin, keratin, etc., be estimated by the amount of amido-compounds (glycocine, leucine, glutamic acid, etc.) formed from them. The present paper relates, however, to gelatin and the glycocine formed from it.

The glycocine is estimated by converting it, by the use of hydrochloric acid and benzoic chloride, into hippuric acid, which is crystallized out and weighed. Leucine, etc., may be estimated by forming similar benzoyl compounds.

Reactions of Glyoxylic Acid. C. Böttinger. (*Archiv der Pharm.*, ccxxxii. 1-3. From *Journ. Chem. Soc.*) Glyoxylic acid forms with dimethylaniline a colourless condensation product, readily soluble in a dilute solution of caustic soda, from which it is precipitated by dilute acetic acid in slender, colourless needles; when boiled with an aqueous solution of mercuric chloride, a deep blue coloration is developed.

The liquid obtained by warming glyoxylic acid and resorcinol with a small quantity of absolute alcohol, gives, on dilution with water and careful addition of ammonia, a deep blue colour which

soon becomes bright red; when caustic soda is employed, the final tint is cherry red. If a mixture of glyoxylic acid and resorcinol is heated on a water-bath with concentrated sulphuric acid, evolution of carbonic anhydride takes place, and a substance is obtained which is scarcely soluble in water or dilute caustic soda.

An ammoniacal solution of the compound formed on adding glyoxylic acid to β -amidoalizarin dissolved in concentrated sulphuric acid, has a deep violet-red colour. A brown, crystalline substance has been obtained by adding glyoxylic acid to an alcoholic solution of α -naphthylamine.

Estimation of Salicylates. L. Barthe. (*Bull. de la Soc. Chim.* [3], xi. 516-522.) The author's method is based on the non-volatilization of salicylic acid with aqueous vapour at 50° - 60° C. The alkaline salicylate (salicylates of other metals must first be converted into sodium salicylate) is dissolved in dilute hydrochloric acid, the solution evaporated to dryness at 50° - 60° , the residue dissolved in water of 50° to 60° , and the salicylic acid titrated with standard alkali in presence of phenolphthaleïn. In the case of ammonium salicylate litmus is used as indicator. At the end of the titration, an indirect estimation of the alkali-metal can be made in the same mixture by titrating the chlorine with silver nitrate.

Tests for the Purity of Tannic Acid. G. Vulpius. (*Chemist and Druggist*, January 26th, 1895, from *Pharm. Centr.*) The author finds that all commercial samples of tannin, when tested in 5 per cent. solutions with potassium cyanide solution, show a pink colour after a few minutes, indicating the presence of gallic acid. He does not consider the ether test of the German Pharmacopœia trustworthy, as ether of 0.720 specific gravity is not absolute, and any ether containing small proportions of water and alcohol has a slight but appreciable solvent action on tannic acid.

American Isinglass as a Substitute for Hide Powder in Tannin Estimations. W. T. Wenzell. (*Amer. Journ. Pharm.*, September, 1894, 447-449.) In order to prepare this isinglass for the purpose here indicated, it is packed moderately firmly into a conical glass percolator, having its lower orifice corked, covered with distilled water, and allowed to stand about twelve hours. Then the cork is removed and the water allowed to drain. The cork is then replaced, more water poured on to cover the isinglass, and the operation repeated about four times or more until the water that drains away is not affected on the addition of a solution of tannic acid. During warm weather, or if the isinglass should acquire an

odour indicating putrefactive decomposition, the addition of about 10 per cent. of alcohol to the water will be necessary. The isinglass is then transferred to a muslin strainer, and strongly expressed in order to remove as much of the water as possible. The moist mass is then to be returned to the percolator, covered with stronger alcohol, allowed to stand for twelve hours, transferred to the strainer and again expressed. The cake of isinglass is finally spread out by picking it apart, laid on glass or porcelain plates, and allowed to dry in a current of air.

Of the isinglass thus prepared, 1 gram is stated to be sufficient for detannating 50 c.c. of the decoction. The isinglass is added to 50 c.c. of water contained in a flask of 150 c.c. capacity, allowed to swell for about fifteen minutes, and vigorously shaken. The violent agitation causes the isinglass to break up into a pulpy condition. It is then to be transferred to a muslin strainer, and as much water as possible squeezed out. The moist isinglass is now placed in a flask containing 50 c.c. of the decoction of oak bark or other drug to be tested, and the whole is well shaken for about fifteen minutes, when the decoction will be found to be detannated.

The author states that by the use of this substance half an hour is sufficient to accomplish what would take many hours to effect in the case of hide powder.

Separation and Estimation of Small Quantities of Ethyl and Methyl Alcohols. L. Prunier. (*Journ. de Pharm.* [5], xxix. 407-410.) After the isolated alcoholic liquid has been treated with concentrated hydriodic acid to convert the alcohols into the corresponding haloid salts, the liquid is shaken with pure chloroform; or it may be distilled, and the first portions condensed in a receiver containing chloroform. After removing free acid by shaking with aqueous potash, the chloroform is agitated with a solution of silver nitrate and a little moist silver oxide, which, after some time, will cause a precipitate of silver iodide. This is washed, first with ammonia, and then with nitric acid, and weighed. If ethyl alcohol alone be present, its amount may be at once calculated from the weight of the silver iodide; but if both alcohols are present, their total amount must be ascertained from the specific gravity of the distillate, and their respective amounts calculated from the amount of silver iodide obtained.

The presence of methyl alcohol may be suspected when the chloroformic solution of the hydriodides boils below 61°, also by the alcohol yielding formic acid on oxidation. Ethyl alcohol, on

the other hand, may be approximately estimated by determining the amount of iodoform it yields.

Detection of Methylated Spirit in Tinctures, etc. A. Ashby. (*Analyst*, xix. 261-271.) Of the numerous methods proposed, the author gives preference to the test with sodium nitroprusside in the presence of ammonia, which produces a red coloration within 15 minutes if methylated spirit is present in the distillate. 25 c.c. of the tincture are distilled, and the first 5 c.c. passing over submitted to the test. If the sample is very weak in alcohol, 2 or 3 c.c. of strong pure alcohol should be added to the distillate before applying the test.

Reactions of Morphine. G. Bruylants. (*Pharm. Journ.*, 3rd series, xxv. 1123, 1124, from *Journal de Pharm.*, May 1st, 1895.) The following modification of Fröhde's test, combined with that of Husemann, is suggested:—A portion of the alkaloidal residue is dissolved in sulphuric acid in a watch glass; a little of this solution is placed on the surface of a white tile, and a trace of Fröhde's reagent containing 1 centigram of molybdate in each cubic centimetre of acid is added, when the well-known lilac tint is produced. The watch glass and its contents are then warmed on the water-bath, another portion is taken up and treated while hot with the same reagent. In the warm solution, a fine green colour is obtained. If now a minute particle of potassium nitrate be dropped into the green solution, the tint immediately changes from green to red, slowly fading and becoming yellowish. The other opium alkaloids, when subjected to the same successive tests, produce colorations quite distinct from those obtained with morphine.

On adding a trace of solution of iodic acid to a warm solution of morphine in sulphuric acid, a lilac tint, passing slowly to red, is obtained; with more of the reagent a red colour is immediately produced.

Detection of Colchicine. E. Barillot. (*Journ. Chem. Soc.*, from *Bull. de la Soc. Chim.*, 1894, 514-516.) To detect colchicine, the suspected alkaloid in the form of the free base is heated with oxalic acid (0.25 gram) and concentrated sulphuric acid (1 c.c.) for an hour at 120°, and the product is diluted with water. If colchicine is present, the colour is yellow before the heating and reddish-brown afterwards, and is not affected by the dilution with water. Excess of alcoholic soda is now added, followed by excess of acetic acid, and the acid solution is extracted with chloroform; if colchicine were originally present, the chloroform extract would

contain a yellow colouring matter, which, when dried, yields a violet-red coloration with concentrated nitric acid, and a raspberry-red with concentrated sulphuric acid. If the colouring matter is not entirely taken up by the chloroform, but floats about in flakes, it may be collected on a very small filter, and the dried strips of the latter immersed in the acids.

Ptomaines give no reaction under this treatment. Morphine and codeine also yield coloured products, but these are quite distinct. The test is practicable even with $\frac{1}{8}$ milligram of colchicine.

Reactions of Chelidonine. J. A. Battandier. (*Comptes Rendus*, cxx. 270.) On mixing 1 drop of guaiacol and about 0.5 c.c. of strong sulphuric acid in a porcelain dish, and then placing a small quantity of chelidonine very close to the mixture, intensely bright red streaks will soon be observed to radiate from the particle of alkaloid. With thymol in the place of guaiacol, a pink coloration is obtained, lasting for many hours.

Tests for the Purity of Phenacetin. G. Guasti. (*L'Orosi*, xvii. 111-115. From *Journ. Chem. Soc.*) The usual test for the presence of acetanilide in commercial phenacetin consists in heating the suspected sample with soda and alcohol, and then warming with chloroform; if the characteristic odour of the isonitriles is detected, the sample is said to contain acetanilide. The author shows, however, that pure phenacetin gives the isonitrile odour under such circumstances; the test is therefore valueless.

The presence of 4 per cent. of acetanilide in phenacetin may be detected by boiling 0.5 gram of the sample with 10 c.c. of water, cooling, and filtering off the deposited phenacetin; the filtrate is concentrated, boiled with 1 c.c. of concentrated hydrochloric acid, and treated with a little liquid phenol and calcium hypochlorite solution. On adding excess of ammonia the liquid assumes an indigo-blue colour if acetanilide is present.

The following modification of Hirschsohn's method is sensitive to 0.5 per cent. of acetanilide in phenacetin:—1 gram of the sample is boiled with 15 c.c. of water, and the solution cooled and filtered. If acetanilide is present, the filtrate gives a turbidity with bromine water, due to the deposition of parabromacetanilide.

Detection of Toluidine in Aniline. A. Villiers and M. Fayolle. (*Comptes Rendus*, cxviii. 1414.) On adding a small quantity of chlorine water to pure aniline, a brownish coloration is produced; but if toluidine be present the coloration is blue, and gradually changes to a violet-red.

Litmus and Methyl-orange as Indicators. B. Reinitzer. (*Zeitschr. für angew. Chem.*, 1894, 547-554, 574-579.) The author's experiments indicate that, in the entire absence of carbonic acid, litmus is superior to methyl-orange as an indicator in titrations.

Litmus and Methyl-orange as Indicators. G. Lunge. (*Zeitschr. für angew. Chem.*, 1894, 733-738.) Referring to a paper on this subject by Reinitzer (preceding abstract), the author, while admitting that in very dilute solutions litmus may be a more delicate indicator than methyl-orange, shows there is no marked superiority of one over the other in general.

Employment of Borax for Standardising Acid Solutions. E. P. Perman and W. John. (*Chemical News*, lxxi. 296.) The author confirms the value of borax for the titration of acids, and claims for it as special advantages that the quantity of this chemical required is proportionally large, that the end of the reaction is very sharply defined, and that it is easy to obtain borax in a state of purity. The indicator employed is methyl-orange. Litmus or phenolphthaleïn cannot be used.

Indole as a Test for Nitrites. O. Bujwid. (*Chem. Zeit.*, xviii. 364.) If 10 c.c. of water containing nitrites are acidulated with a few drops of hydrochloric acid, then heated to about 75° C., and tested while hot with a few drops of an alcoholic solution of indole (containing 0.15 gram per litre), a fine red coloration is obtained. The quantity of nitrite present can be determined colorimetrically by means of this reaction.

Estimation of Iodine in the Presence of Chlorine and Bromine. A. Villiers and M. Fayolle. (*Comptes Rendus*, cxviii. 1332-1335.) The silver compounds of the three halogens are decomposed with sulphuretted hydrogen, and after expelling the excess of this gas, the filtrate is treated with a semi-normal solution of pure ferric chloride. The liberated iodine is then extracted by repeated agitation with successive quantities of carbon bisulphide until the latter remains colourless. The united iodine solutions are freed from any traces of ferric chloride, and then titrated with sodium hyposulphite in the usual manner. The proportion of ferric chloride solution employed should not be less than 5 c.c. for every 0.1 gram of iodine present.

Detection of Traces of Chlorides. A. Villiers and M. Fayolle. (*Comptes Rendus*, cxviii. 1413.) The authors modify the test previously described (*Year-Book of Pharmacy*, 1894, 111) by substituting orthotoluidine for the aniline previously recommended. A

fine blue coloration, changing to violet-red on heating or standing, is thus obtained with as little as 0.1 milligram of chlorine. In order to avoid the disturbing effect of bromides, a reagent is suggested consisting of 10 volumes of colourless, saturated, aqueous solution of aniline, 2 volumes of saturated aqueous solution of orthotoluine, and 3 volumes of glacial acetic acid. If this reagent be used in excess, no bromotoluidine is formed, but the bromine is converted into the stable and perfectly white brom-aniline, which does not interfere with the observation of the blue coloration alluded to.

Estimation of Chlorides in Products of Organic Origin. G. Meillère. (*Journ. de Pharm.* [5], xxix. 497-499.) The substance under examination is mixed with an equal volume of a 20 per cent. solution of calcium nitrate, the mixture evaporated to dryness, and the residue incinerated at a moderate temperature. After treating with water and filtering, a drop of solution of tropæolin is added, and then sufficient dilute sulphuric acid to produce a reaction. The liquid is now neutralized with precipitated chalk, and the chlorine titrated with silver nitrate in the presence of potassium chromate.

Detection of Alkali Perchlorates in the Presence of Chlorides, Chlorates, and Nitrates. F. A. Gooch and D. A. Kreider. (*Zeitschr. für anorg. Chem.*, vii. 13-16.) After removing chlorates by evaporating with strong hydrochloric acid, and then removing any nitrates present by evaporation with 2 c.c. of a saturated solution of manganous chloride in concentrated hydrochloric acid, and subsequent re-evaporation with 1 to 2 c.c. of concentrated hydrochloric acid, followed by the removal of the manganese by sodium carbonate, the liquid thus obtained (or the original solution if chlorates and nitrates were absent) is evaporated to dryness in a test-tube, and the residue fused with anhydrous zinc chloride. Any perchlorate present will thus cause an evolution of chlorine, which may be readily detected by its action on potassium iodide and starch.

Estimation of Carbonates in Presence of Soluble Sulphides. A. Wolkowicz. (*Zeitschr. für angew. Chem.*, 1894, 165.) The substance under examination is covered with a 20 per cent. solution of copper chloride, and then decomposed by hydrochloric acid in a suitable apparatus. The sulphuretted hydrogen is thus completely retained by the copper solution. The liberated carbonic anhydride is dried, and then absorbed in weighed tubes filled with soda-lime,

Estimation of Carbonic Anhydride in the Air. F. Kratschmer and E. Wiener. (*Monatshefte*, 1894, xv. 429-432.) The method described in this paper depends on the fact that when a solution of sodium carbonate is titrated with sulphuric acid at the ordinary temperature, using phenolphthaleïn as indicator, decolorisation of the latter takes place as soon as one-half of the sodium carbonate has been decomposed with formation of sodium sulphate and sodium bicarbonate. With a mixture of solutions of sodium hydrate and carbonate, decolorisation takes place as soon as the whole of the former and half of the latter have been neutralised. If, therefore, equal volumes of a solution of sodium hydrate be titrated with sulphuric acid, the one immediately, and the other after shaking with a known volume of air containing carbonic anhydride, the difference in the amount of acid required in the two cases is equivalent to one-half of the amount of sodium carbonate formed by the carbonic anhydride.

The authors employ a solution of sulphuric acid of such strength that 1 c.c. is equivalent to 1 milligram of carbonic anhydride, and the number of milligrams of carbonic anhydride in any volume of air taken is found by doubling the number of cubic centimetres representing the difference between the two titrations.

Volumetric Estimation of Phosphoric Acid. R. Segalle. (*Zeitschr. für analyt. Chem.*, 1895, 33-39.) To the solution of the phosphoric acid a measured excess of standard ammonia solution is added, followed by a sufficient quantity of neutral solution of magnesium sulphate. The mixture is made up to a known volume, thoroughly shaken, and at once passed through a dry filter. The excess of ammonia is then titrated, and 1 molecule of phosphoric acid calculated for every 3 molecules of ammonia which have become neutralised.

Volumetric Estimation of Soluble Phosphoric Acid in Superphosphates. W. Kalmann and K. Meissels. (*Journ. Chem. Soc.*, from *Zeitschr. für analyt. Chem.*, xxxiii. 764-766.) Twenty grams of the superphosphate are dissolved to one litre. (a) 100 c.c. of the filtered solution, coloured with methyl-orange, are accurately neutralised with seminormal alkali. Phenolphthaleïn is then added, and the amount of alkali required to produce the pink colour is noted. (b) 100 c.c. of the solution are mixed in a 250-c.c. flask with a moderate excess of seminormal alkali, made up, shaken, and filtered from the precipitated tricalcium phosphate. One hundred c.c. of the filtrate are mixed with phenolphthaleïn and neutralised with seminormal acid. Methyl-orange is then added, and the

amount of acid required to produce the change of colour is ascertained. Titration (*b*) gives a result which is exactly as much too low as that of (*a*) is too high. The arithmetical mean, multiplied by 0.0355, gives the amount of phosphoric anhydride in 2 grams of the substance. The results agree closely with those of the citrate method.

Nitrite of Cobalt and Sodium as a Reagent for Potassium.

J. van Eyk. (*Chem. Centr.*, 1894, 1162. From *Nederl. Tijdsch. Pharm.*, vi. 136-139.) The reagent recommended by the author is prepared by slowly adding 100 c.c. of a 60 per cent. solution of sodium nitrite to a solution of 30 grams of cobalt nitrate in 60 grams of water, allowing to stand till the evolution of gas has ceased, then filtering, and precipitating the double salt from this solution by alcohol. This reagent is stated to be so sensitive that potassium can be detected with it in solutions containing as little as 1 in 10,000. Ammonium salts, if present, should first be removed, as they too form a similar precipitate with this test, though they are not affected by it in solutions of the same degree of dilution. The yellow precipitate formed with potassium salts is, of course, the same as is obtained in testing for cobalt with potassium nitrite.

Estimation of Calcium Oxide in Quicklime. W. E. Stone and F. C. Scheuch. (*Journ. Amer. Chem. Soc.*, xvi. 721-723.) The calcium oxide is separated from the carbonate, as well as from magnesia, ferric oxide, and alumina, by shaking 1 gram of the finely powdered sample with 150 c.c. of a 10 per cent. solution of cane sugar for 20 minutes. The solution is then filtered, and the filtrate titrated with standard hydrochloric acid.

Reactions of Sodium Peroxide. T. Poleck. (*Ber. der deutsch. chem. Ges.*, xxvii. 1051-1053. From *Journ. Chem. Soc.*) The chemical behaviour of sodium peroxide is quite analogous to, but much more energetic than, that of the peroxide of hydrogen or barium. It reduces salts of gold, silver, and mercury to the metallic state, with evolution of oxygen; platinic chloride solution is only reduced after decomposition of the hydrogen platinochloride by the addition of a silver salt. Sodium peroxide precipitates ferric hydrate from ferrous and ferric solutions, and manganese peroxide and cobalt oxide from manganese and cobalt solutions respectively; it reduces permanganic acid to manganese peroxide, and oxidises chromous oxide to chromic anhydride. With uranium salts, it yields sodium peruranate, $\text{Na}_4\text{U}_2\text{O}_8 + 8\text{H}_2\text{O}$ (Fairley's formula is $\text{Na}_4\text{UO}_8, 8\text{H}_2\text{O}$), which is precipitated by the

addition of alcohol, and sets free chlorine from hydrochloric acid; on prolonged boiling, the solution of peruranate becomes red, evolves oxygen, and then deposits sodium uranate. Sodium peroxide rapidly oxidises the hydrate and salts of bismuth to bismuthic acid, and immediately reduces potassium ferricyanide to the ferrocyanide; the latter reaction forms the basis of Kassner's method for estimating the peroxide. Iron and chromium, or manganese and chromium, may be separated and estimated by the use of sodium peroxide, since the chromium is oxidised to chromic anhydride, whilst the other metals are precipitated. Tin, antimony, and arsenic may also be separated by precipitating as sulphides with ammonium sulphide, evaporating off the excess of the latter, and oxidising the dissolved sulphides with sodium peroxide; the oxides of the metals may then be separated in the ordinary way. The oxidised product may be at once tested for arsenic by Marsh's method, which would be impossible if nitric acid had been the oxidising agent employed. The fusion of silicates and metallic minerals with a mixture of sodium carbonate and peroxide would lead to an excellent method for their analysis, if crucibles of porcelain, platinum, nickel, and silver were not considerably corroded during the process.

Sodium metaplumbate is formed by the action of the peroxide on lead oxide, in presence of water; the orthoplumbate could not be prepared. Iodine combines with the peroxide on heating, with formation of sodium periodate. It would seem that the peroxide might advantageously be used as an oxidising agent for organic substances; it does not act on alcohol, but ether inflames on contact with it.

Application of Sodium Peroxide in Analysis. O. Kassner. (*Archiv der Pharm.*, cccxxii. 226-240. From *Journ. Chem. Soc.*) Compare also T. Poleck (preceding abstract). The author has detected ozone in the oxygen which is evolved when sodium peroxide is dissolved in water, and attributes the activity of sodium peroxide as an oxidising agent to its presence. When sodium peroxide is added to a solution of uranyl nitrate, the yellow precipitate, which is at first formed, redissolves, and from the solution Fairley's sodium peruranate may be precipitated by alcohol. Whilst chromium hydrate readily passes into solution as sodium chromate, manganous hydrate is only oxidised to the hydrated peroxide, and ferrous hydrate to ferric hydrate. Upon these facts the author bases a process for separating chromium from manganese and iron which is obvious. If sodium peroxide is

substituted for a mixture of sodium carbonate and potassium nitrate as an oxidant for manganese oxides, an excess must be avoided, otherwise, on dissolving the product in water, the manganate will be reduced by this excess. Sodium peroxide may be substituted for hydrogen dioxide in the method described by G. Kassner, which may be applied for the estimation of potassium ferri-cyanide. Cobalt is precipitated as black sesquioxide by sodium peroxide, but nickel remains as the green hydrate; neither metal is precipitated by this reagent from a potassium cyanide solution. Mercury, gold, and silver salts are reduced to the corresponding metals by sodium peroxide; but the solutions of chloroplatinic and chloropalladious acids are not reduced, since their sodium salts appear to be stable; solutions of platinic and palladious chloride, obtained by adding silver nitrate to the acids, are, however, reduced.

For the quantitative separation of antimony, tin, and arsenic, sodium peroxide may be applied as follows:—The mixed sulphides are stirred with about 30 c.c. of water, and sodium peroxide is added by degrees, until a small portion no longer gives a coloured precipitate on the addition of dilute sulphuric acid. The whole is then transferred to a silver crucible, evaporated to dryness, and kept in fusion for some time. The fused mass is treated with aqueous alcohol (3 : 1), and the undissolved sodium pyroantimonate collected on a filter and weighed as antimonyl antimonate. After the alcohol has been evaporated from the filtrate, this is acidified with dilute sulphuric acid, the precipitated stannic acid is dissolved by caustic soda, and carbonic anhydride is passed through the solution to incipient precipitation; ammonium chloride is then added, and the solution heated for half an hour to completely precipitate the stannic oxide, which is weighed as usual. The arsenic is precipitated from the second filtrate by magnesia mixture.

Qualitatively, the method may be modified by testing a small portion of the oxidised mixture (care having been taken that all the sodium peroxide has been previously decomposed by boiling) for antimony by adding a little of the liquid to some acidified potassium iodide solution; if antimony be present, it will be separated on adding alcohol after a somewhat prolonged digestion with sodium peroxide.

A Delicate Test for Copper. P. Sabatier. (*Chem. Centr.*, 1894, i. 657.) Compare also this volume, p. 29. If one drop of a solution of copper salt is added to 1 c.c. of concentrated hydro-

bromic acid, the mixture heated to expel any free bromine and then allowed to cool, a purple or lilac coloration is produced according to the amount of copper present. The concentrated hydrobromic acid may be replaced by a mixture of solid potassium bromide with a saturated solution of orthophosphoric acid.

Estimation of Arsenic in Copper. F. Platten. (*Journ. Soc. Chem. Ind.*, 1894, 324-326.) The author's process, which is based on the complete decomposition of arsenious sulphide by the prolonged action of a large quantity of boiling water, is carried out as follows:—The distillate obtained on heating the copper with ferric hydrate and an excess of hydrochloric acid is precipitated with sulphuretted hydrogen, and the precipitate then collected, washed, and boiled with about half a litre of water for some time. After cooling, the arsenic is titrated with centinormal iodine solution in the usual manner.

Detection and Estimation of Small Quantities of Arsenic in Copper. F. A. Gooch and H. P. Moseley. (*Zeitschr. für anorg. Chem.*, 1894, vii. 127-131.) A quantity not exceeding 1 gram of the copper is dissolved in dilute nitric acid, the solution mixed with 2-3 c.c. of strong sulphuric acid, and the mixture evaporated until fumes of sulphuric acid are evolved. The residue is repeatedly distilled with potassium bromide and an excess of strong hydrochloric acid, and the final distillate treated with a small quantity of solution of stannous chloride in hydrochloric acid to convert any free bromine into hydrobromic acid. The resulting liquid is now submitted to Marsh's test, and the mirror obtained compared with a series of standard arsenical mirrors.

Qualitative Separation of Nickel and Cobalt. A. Villiers. (*Comptes Rendus*, 1895, 46, 47.) When solutions of nickel and cobalt salts free from any excess of mineral acid are mixed with sodium tartrate and sodium hydrate and then treated with sulphuretted hydrogen, cobalt sulphide is precipitated, while nickel sulphide remains in solution and imparts to the filtrate a dark-brown colour, which serves as a very delicate reaction for nickel, even in the presence of very large quantities of cobalt. Ammonium salts have a disturbing influence on the reaction, and should therefore be removed, if present, before applying the test.

Volumetric Estimation of Zinc. G. C. Stone. (*Journ. Amer. Chem. Soc.*, xvii. 473.) The author uses the ferrocyanide process, but employs a weak solution of cobalt nitrate as indicator. A drop of the latter is placed on a white slab so as only just to touch the drop of the mixture, which is tested from time to time. A

greenish coloration at the line of contact between the two marks the end of the reaction.

Volumetric Estimation of Gold. G. Franzeschi. (*Chem. Centr.*, 1894, i. 657, from *Bull. Chim. Farmac.*) The solution of the gold salt, which should not contain free hydrochloric acid, is boiled for a few minutes with a measured excess of decinormal potassium oxalate, the mixture allowed to cool, and then filtered to remove the precipitated gold, the filtrate warmed with 1 c.c. of dilute sulphuric acid, and the excess of potassium oxalate now determined by titration with standardized decinormal potassium permanganate. Each c.c. of decinormal oxalate consumed represents 0.0063 gram of gold.

Estimation of Organic Matter in Water by the Permanganate Process. A. Zega. (*Chem. Zeit.*, xviii. 2, 3.) The author recommends the following *modus operandi* as yielding trustworthy and concordant results:—A mixture of 50 c.c. of the water with 5 c.c. of dilute sulphuric acid (1 : 2) and 5 c.c. of the usual permanganate solution is heated for 20 minutes in a flask of 100 c.c. capacity on a water-bath. The excess of permanganate is then determined by titration with standardized solution of oxalic acid. A blank experiment is made with distilled water under the same conditions, in order to check the standard permanganate solution.

Improved Methods of Water Analysis. I. A. Bachman. (*Journ. Amer. Chem. Soc.*, 1895, 296–303.) Reporting on the albuminoid ammonia process, the author describes a new apparatus which is so arranged that 50 c.c. of permanganate solution can be made to act at first on only 50 c.c. of the water, and after 30–40 c.c. have distilled over, the remaining 250 c.c. of water can be added at the same rate at which the distillation proceeds, which should not exceed 15 c.c. in every 15 minutes. The distillation is continued until 250–300 c.c. have passed over. The water employed in the process is, as usual, first freed from ammonium salts by distilling 500 c.c. with sodium carbonate until about 300 c.c. are left. The above modification is based on the observation that, in the ordinary process, the evolution of ammonia is often increased as the liquid in the retort becomes more concentrated.

As an improvement in the organic carbon process, the author suggests the evaporation of water in a vacuum in preference to open-air evaporation.

Determination of the Hardness of Water. F. Hundeshagen. (*Chem. Zeit.*, xviii. 505.) The reagents employed by the author are a solution of 3.786 grams of sodium carbonate in 1 litre of

water and dilute nitric or hydrochloric acid of corresponding strength. 200 c.c. of the sample are titrated directly with this acid, tincture of cochineal serving as indicator. Each c.c. of acid shows 1° of temporary hardness (German scale). The permanent hardness is estimated as follows:—200 c.c. of the sample are mixed with a moderate excess of the sodium carbonate solution, evaporated to dryness, and the residue, after being moistened with a little water, is once more evaporated and heated to about 200°. It is now dissolved in a little water, the liquid filtered, and the insoluble matter washed with about 50 c.c. of water. The filtrate is then titrated as before. The number of c.c. of acid deducted from the c.c. of added soda represents the permanent hardness. The total hardness may be estimated directly by using the resulting liquid from the estimation of the temporary hardness for the determination of the permanent hardness.

Avoidance of Errors in the Determination of the Hardness of Water by the Soap Test. A. Bomboletti. (*Gazz. Chim. Ital.*, 1894, xxiv. ii. 26–30.) The errors due either to very excessive or very slight hardness are avoided by first making an approximate estimation in the usual manner, and then comparing the water, diluted if necessary, with the standard solution of calcium chloride reduced to about the same degree of hardness.

Detection of Boric Acid in Wine. P. Kulisch. (*Zeitschr. für angew. Chem.*, 1894, 147, 148.) In preference to the mode of testing proposed by Ripper, the author suggests that the ash of 50 c.c. of wine should be treated with a few drops of hydrochloric acid, and then tested with a strip of good turmeric paper of a decided yellow colour.

A Method for the Rapid Detection of Mineral Adulterants in Flour. M. Rondelet. (*Journ. de Pharm. d'Anvers*, i. 363.) A small quantity of the flour is placed on a slide, and one or two drops of an aqueous solution of aniline and alcoholic fuchsine solution are then added, and followed by an equal quantity of tincture of iodine and distilled water. On applying a cover glass and examining, the cellulose appears reddish-brown and starchy matter black; but any mineral matter present will be yellowish or colourless, and on the addition of a drop of water any crystals present appear distinctly defined as such.

Estimation of Fat in Bread. M. Weibull. (*Zeitschr. für angew. Chem.*, 1895, 199–202; *Journ. Chem. Soc.*, Sept., 1894.) In reply to Polenske the author publishes a large number of further experiments showing his process to give perfectly trustworthy

results, if the following *modus operandi* be adopted:—4 grams of new, or 3 grams of stale bread are put into a 70 c.c. beaker and covered with 30 c.c. of water, and 10 drops of dilute sulphuric acid. The whole is boiled very carefully at first, over a very small straight flame for at least $\frac{3}{4}$ hour, some hot water being occasionally added to rinse the sides of the beaker. Towards the end the liquid is evaporated to about half its bulk. While still warm, the contents are carefully neutralised with powdered marble, a large excess being avoided. The mixture is then spread over a piece of filter paper (such as is used in Adam's milk process), and any liquid remaining in the beaker is removed by means of a piece of cotton-wool, which is then put on to the filter paper. The latter, resting on iron gauze, is first dried for 10 minutes at 100°. The paper is now rolled into the usual shape, and then dried for 3–4 hours at 100°–103°. After this it is placed in a Soxhlet's apparatus and extracted at least 60 times with pure ether, which operation will occupy from 4–5 hours.

Detection of Margarin in Butter. A. Seyda and E. F. R. Woy. (*Chem. Zeit.*, xviii. 906, 907.) The authors have critically examined the three principal processes in use for the detection of margarin in butter; viz., *Köttstorfer's Process*, giving the saponification number of the sample; the *Reichert-Meissl Method*, based on the estimation of the volatile fatty acids; and *Hehner's Method*, which is based on the estimation of the insoluble fatty acids. Of these he gives decided preference to Köttstorfer's method, which he finds simple, convenient, and almost free from analytical errors, and affected only by the natural variation in the composition of butter fat.

Valenta's Acetic Acid Test for the Purity of Butter. W. Chatteraway, T. H. Pearmain, and C. G. Moor. (*Analyst*, xix. 147–150.) The authors have adopted the following *modus operandi*:—

A short and somewhat thick test-tube of about 4 in. \times $\frac{1}{2}$ in., into which a well-fitting stopper has been ground, is chosen; 2.75 grams of the fat are then weighed into the tube, and 3 c.c. of acetic acid of exactly 99.5 per cent. strength are measured from a burette, and added to the fat. The tube is then stoppered and placed in a beaker of warm water, increasing the heat until, after shaking, the contents become quite clear. The source of heat is then removed, and the tube is so placed that it is in the centre of the beaker; the whole is then allowed to rest until the change from transparency to turbidity occurs, when the temperature is observed by means of a thermometer which has been previously attached to

the test-tube by a rubber band. The change is very well marked. It is of the utmost importance that the fat or oil—olive oil, for instance—should be entirely free from water. The fat should also not have been subjected to any over-heating.

The authors have tabulated the results of their experiments with a large number of oils and fats. As regards butter, figures varying from 39° – 29° were obtained, whilst "margarin" gave 97° – 94° . The test seems most useful when applied to butters, margarins, or mixtures of the two.

Detection of Adulteration in Lard. M. Samelson. (*Zeitschr. für analyt. Chem.*, xxxiii. 189–192.) The author finds that Becchi's and Gantter's processes for the detection of vegetable fats in lard occasionally fail to give any indication in cases of undoubted adulteration, while Welmans' method may indicate adulteration in a perfectly pure sample. In the author's opinion, the iodine absorption is at present the most trustworthy test.

Detection of Cotton-Seed Oil in Lard. E. J. Bevan. (*Analyst*, xix. 88, 89.) The author reports upon a sample of genuine lard, which, however, gave a decided silver reaction. By scraping off the top portion and taking a part of what lay underneath, to which the air had not penetrated, no silver reaction was obtained. The same result was obtained with bladder lard, and here the possibility of any mechanically deposited dirt being present was out of the question. Lard was then exposed in a still room in flat dishes, and after a week's exposure it gave the reaction quite strongly. The author arrives at the conclusion that the effect observed was due to an oxidation process. After passing air for a few days through melted lard, a product was obtained which gave an intense reaction with silver solution. The substance formed appears to be present in very small quantity, which is sufficient, however, to give the erroneous impression that cotton-seed oil is present.

A New Method for the Analysis of Fats and Resins. P. C. McIlhiney. (*Journ. Amer. Chem. Soc.*, xvi. 275–278. From *Journ. Chem. Soc.*) The author's process is based on the fact that the unsaturated constituents of fats combine with bromine forming simple additive products, whilst resins and resin oils are acted on with formation of hydrogen bromide.

The following reagents are required:—N/3 solution of bromine in carbon tetrachloride; N/10 solution of sodium thiosulphate; N/10 solution of potassium hydrate. Not more than 1 gram of the sample of suspected oil is dissolved in 10 c.c. of carbon tetrachloride

in a bottle of 500 c.c. capacity provided with a carefully ground glass stopper. An accurately measured excess of the bromine solution is added, the bottle tightly stoppered and placed in a dark place for 18 hours. The bottle is cooled with ice to form a partial vacuum, and a piece of wide rubber tubing, about $1\frac{1}{2}$ inches long, is slipped over the lip of the bottle so as to form a well about the stopper. This well is filled with water and the stopper carefully lifted, when the water will be sucked into the bottle and dissolve any hydrobromic acid. When 25 c.c. of water have been added, the bottle is well shaken and 20 c.c. of a 20 per cent. solution of potassium iodide are added. The liberated iodine is now estimated with thiosulphate, a check experiment being made as usual, and the difference calculated to the percentage of bromine. The contents of the bottle are now transferred to a separating funnel, and the aqueous portion is separated, filtered through a cloth filter, and titrated with potassium hydrate with methyl-orange as indicator. This gives the acidity which may be conveniently expressed in percentages of free bromine. Multiplied by 2 and deducted from the *total* bromine, the bromine *addition* number is obtained.

The latter is *nil* for rosin and rosin oils, but reaches the high figures of 102.88 and 103.92 for fresh and boiled linseed oils. The author is engaged in the investigation of a large number of oils and resins by means of this method, and hopes to furnish new analytical *data* for their commercial analysis.

Detection of Petroleum, Rosin Oil, and Similar Adulterants in Essential Oils. J. Klimont. (*Chem. Zeit.*, xviii. 641, 642; 672, 673.) The author's process is based on the fact that ethereal oils react strongly with bromine, whilst paraffin oil gives scarcely any reaction. For the assay of oil of turpentine, for instance, the following reagents are required:—Solution of bromine in chloroform of about 1 per cent. strength; pure chloroform, treated with strong sulphuric acid, washed, and redistilled; pure turpentine, made by first washing oil of turpentine with aqueous soda, and afterwards collecting the fraction distilling over at 168° – 170° . 0.5 c.c. of this is put into a stoppered 20 c.c. flask and accurately weighed; chloroform is then poured in up to the mark, and the solution put into a small burette. 10 c.c. of the bromine solution is introduced into another little flask, and the turpentine solution slowly added until the colour of the bromine has entirely disappeared. If now a suspected sample of turpentine is at once treated in the same way as the pure specimen, its lesser bromine-

decolorising power will indicate a more or less marked adulteration.

The author has tabulated the results of experiments with almost every known ethereal oil, including 9 specimens of refined turpentine and 11 of inferior brands; also experiments with adulterants, such as resin oil and petroleum. The figures given are not bromine numbers, but represent the equivalent amount of turpentine.

Estimation of Rosin Oil in Mineral Oils. P. C. McIlhiney. (*Journ. Amer. Chem. Soc.*, xvi. 385-388. From *Journ. Chem. Soc.*) After describing various published processes for effecting the separation, the author finally recommends the following method:—50 c.c. of nitric acid of 1.2 sp. gr. are heated to boiling in a 700 c.c. flask, and after removing the source of heat 5 grams of the suspected oil are added. The flask is then heated on the water-bath, with frequent shaking, for about 20 minutes, when about 400 c.c. of cold water are added. After cooling, the liquid is shaken with 50 c.c. of light petroleum, which dissolves the oil which has not been acted on. The liquid is now carefully poured off from the resinous matter into a separator, and, after settling, the aqueous portion is drawn off, and the petroleum poured into a tared flask. The flask containing the resin is rinsed out with some more light petroleum, which is then also introduced in the tared flask. After distilling off the solvent, the oil is weighed. It must be remembered that even pure mineral oils lose about 10 per cent. of their weight by the nitric acid treatment. The test-analysis is very satisfactory.

Analysis of India-rubber Wares. R. Henriques. (*Chem. Zeit.*, xviii. 411, 412, 441-444. From *Journ. Chem. Soc.*) The author gives further instructions for the analysis of rubber wares. Adulteration with fatty matter or fatty surrogate (*faktis*) may be detected by treating a weighed quantity of the sample with alcoholic soda, as previously described, and noticing the loss in weight. If the sample contains much added mineral matter, it is best to first treat it with moderately strong acid before boiling with the alkali; as the latter dissolves small quantities of rubber, a correction must be made by deducting from the weight of the surrogate a quantity corresponding with 2.5 per cent. of the rubber actually found; soluble sulphur is, of course, allowed for. Asphalt, whether true bitumen or the artificial product, is another adulterant. In the absence of surrogate, 1 gram of the finely divided sample is soaked for an hour in 30 c.c. of nitrobenzene. The insoluble mass is thrown upon a filter, gently pressed with a small pestle, and

further washed with another 30 c.c. of the solvent; the mass is then transferred by means of a wash-bottle to a porcelain dish and boiled with water until all odour of nitrobenzene has disappeared; it is then dried and weighed. As rubber is not altogether insoluble in nitrobenzene, a correction must be made by deducting 2.5 per cent. from the asphalt for true rubber dissolved; soluble sulphur must also be allowed for. If the sample contains also oil surrogate, this must be first removed by treatment with alkali, in which asphalt is practically insoluble. The process becomes still more complicated if, besides asphalt, lamp-black is also present; this withstands the action of all ordinary solvents, and remains in consequence with the rubber. The author has found that in pure rubber there is a fairly constant atomic relation between the hydrogen and the carbon, which may be taken as 16 : 10. The residue containing the rubber + the lamp-black is therefore submitted to an organic combustion, and any excess of carbon put down to lamp-black.

The test analyses given by the author are remarkably satisfactory considering the nature of the analysis. The process does not, as yet, provide for a host of other possible adulterants.

Analysis of Rubber Goods. C. O. Weber. (*Chem. Zeit.*, xviii. 1003-1005, 1040-1041, 1064-1069. From *Journ. Chem. Soc.*) The finely divided sample is first treated with acetone which dissolves fatty and sulphurised oils, mineral oils, rosin oil, natural and added resins, paraffins, free and, in part, combined sulphur. The residue is exhausted with boiling alcoholic soda which dissolves *faktis* and any sulphur or chlorine contained therein. After drying, the mass is extracted with cold nitrobenzene, which dissolves asphalt and any sulphur therein contained. The extraction is then repeated with boiling nitrobenzene, which dissolves the rubber and any vulcanising sulphur. After this, the residue is boiled with water and the solution tested for starch, whilst the insoluble matters will now consist of the mineral matter with any lamp-black and a little sulphur. As it is not practicable to recover the dissolved matter from the alcoholic soda or the nitrobenzene, the insoluble matter must each time be weighed. The adhering nitrobenzene may be easily removed by washing with benzene.

The author also gives a delicate test for the presence of red lead. The finely ground sample is moistened with a solution of aluminium chloride in ether and then heated in an air-bath for two hours at 120°. If red lead is present, the rubber becomes hard and brittle and emits an odour of chlorine.

MATERIA MEDICA AND PHARMACY.

PART II.

MATERIA MEDICA AND PHARMACY.

The Chemistry of Ipecacuanha. B. H. Paul and A. J. Cownley. (*Pharm. Journ.*, 3rd series, xxv. 111-115, 373, 374, 641, and 690-692.) Compare also *Year-Book of Pharmacy*, 1894, 125-127. The authors give a summary of the literature of this subject, showing that all previous investigators, with the sole exception of Glénard, have described as the active principle of this drug a substance possessing no definite individuality, which is now proved to consist of several distinct bases. One of these, for which they retain the name *emetine*, has a composition corresponding to the formula $C_{15}H_{22}NO_2$, and is uncrystallizable, but capable of forming crystallizable salts. It fuses at $68^{\circ}C.$, is readily soluble in ether, alcohol, and chloroform, only slightly soluble in water, and insoluble in solutions of alkalies. Its salts contain one equivalent of acid, are mostly very freely soluble in water, and crystallize most readily in the presence of an excess of acid. The second base, *cephaeline*, corresponds to the formula $C_{14}H_{20}NO_2$. It fuses at $102^{\circ}C.$, is crystallizable, less soluble in ether than emetine, but freely soluble in alcohol or chloroform, much more soluble than emetine in hot petroleum spirit, and readily soluble in solutions of caustic alkalies. Like emetine it forms neutral salts which are more readily crystallizable from acid than from neutral solutions. Both bases are very sensitive to light, and rapidly turn yellow when exposed to the rays of the sun. Their salts, however, if pure, remain colourless when thus exposed.

Emetine and cephaeline are both contained in the ipecacuanha of New Granada, as well as in that of Brazil, the only difference in this respect being the larger relative proportion of cephaeline in the New Granada drug. Emetine, as hitherto met with in commerce, and as described by nearly all previous investigators, is an indefinite mixture of these two bases.

Quite recently the authors have succeeded in isolating a third

alkaloid from ipecacuanha root, existing in it in very small proportion. It differs from the other bases in being very sparingly soluble in ether. It is soluble in alkaline liquids and remains in the ammoniacal liquor from which emetine and cephaeline have been extracted by shaking with ether; from this liquor it is extracted by means of chloroform. It crystallizes in pale yellow transparent prisms which fuse at 138° C., and are readily soluble in alcohol and chloroform, the solutions becoming dark coloured on exposure to light and depositing a dark-brown substance. The base will be further investigated.

The favourable results obtained by some practitioners with demetinisised ipecacuanha in the treatment of dysentery have made it appear probable that the value of the drug might partly be due to a constituent other than the alkaloids. The authors have therefore attempted to isolate and study the constituent described by Willigk, under the name of ipecacuanhic acid, as analogous to tannic acid and having a composition represented by the formula $C_{14}H_{18}O_7$. Following on the lines of Willigk's process, a reddish-brown amorphous product was obtained corresponding to that author's description in being very soluble in water and alcohol, having a bitter taste, and producing a green coloration with ferric salts, but no precipitate with gelatin. It was found to have no emetic action in doses of 4 to 5 grains. After boiling with acids it reduced Fehling's solution. Further results obtained by the authors seem to indicate that this so-called ipecacuanhic acid is not a definite substance, but a mixture requiring further investigation.

The original papers should be consulted for interesting matters of detail not dealt with in this abstract.

Note on the Assay of Ipecacuanha. R. A. Cripps. (*Pharm. Journ.*, 3rd series, xxv. 1093, 1094.) The author describes a number of experiments, from the results of which he draws the following conclusions:—

1. That the Brazilian root alone be official, owing to its marked superiority to the Carthagena (New Granada) drug.
2. That the process of Lyons be officially recognized.
3. That ipecacuanha be required to yield by this process not less than 2.0, nor more than 2.5 per cent. of total alkaloids.
4. That the preparations of ipecacuanha be made by the present official methods, except that in the case of the wine a weaker acid be used for extraction, and the dry extract be assayed and used in such proportion that the finished wine shall contain 0.1 per cent. of alkaloids.

Pending the further development of the chemistry of ipecacuanha, the author considers a standard of total alkaloids the best to be adopted for the present. Details of the process of assay will be found in the original paper.

Ipecacuanha Root. L. F. Kebler. (*Amer. Journ. Pharm.*, 1895, 29.) From the results of an assay of several samples of ipecacuanha root by C. C. Keller's process the author concludes that the thick annulated or "fancy" root is frequently not as valuable as the "wiry" root. In the former he found 1.67 per cent. of total alkaloid against 2.39 in the latter. He also finds the process of titration of the alkaloid with volumetric acid solutions to give very satisfactory results.

The Histology of Ipecacuanha. H. G. Greenish. (*Pharm. Journ.*, 3rd series. xxv. 685-690.) The author gives an interesting account, accompanied by a number of woodcut illustrations, of the structure of the root and stem of Brazilian and Carthagena ipecacuanha. As the report does not admit of condensation without losing much of its value, and is too long for entire reproduction in this place, the reader is referred for details to the original paper.

Adulterated Belladonna Root. C. B. Lowe. (*Amer. Journ. Pharm.*, lxvi. 353.) The author has observed the occurrence of pokeroor (*Phytolacca decandra*) in a sample of belladonna root, and points out the structural and other differences between the two drugs. The much greater diameter of pokeroor should alone be sufficient to prevent its being mistaken for belladonna.

Some Constituents of Senega Root. A. Schneegans. (*Zeitschr. des oesterr. Apoth. Ver.*, 1895, 487, from *Journ. der Pharm. für Elsass-Lothr.*) Rubner and also Goldener have observed the presence of methyl salicylate in samples of this drug (*Pharm. Zeit.*, No. 36, 300), and C. Dünneberger has subsequently pointed out that this constituent is normally present in the genuine root, and that the Swiss Pharmacopœia has adopted the detection of salicylic acid in the ether extract of senega as a test of identity of the drug.

The author has further investigated this subject, and finds that, in addition to methyl salicylate, the root also contains free salicylic acid. Methyl salicylate is not produced by the action of a ferment on a substance corresponding to gaultherin, but exists ready formed in the root. The presence of free salicylic acid can be demonstrated by exhausting 10 grams of the coarsely powdered drug with ether, allowing the united ethereal solutions to evaporate,

then shaking the dry residue with 5 c.c. of warm water, filtering, testing the filtrate with ferric chloride, and finally showing that the violet coloration thus produced does not disappear on shaking with ether, as it would do if the coloration were only due to methyl salicylate. The addition of hydrochloric acid in the extraction of senega, as directed in the test of the Swiss Pharmacopœia, is therefore superfluous.

Adulteration of Senega. (*Pharm. Centr.*, xxxvi. 280.) The admixture referred to in this paper consisted of the roots of *Triosteum perfoliatum*, *N. O. Caprifoliaceæ*, which occurred in the drug to the extent of about 25 per cent. The rootlets of this plant are very much thicker than those of senega, from which this adulterant is also readily distinguished by the entire absence of the keel which is so characteristic in the genuine drug.

Structure of the Rhizome of Podophyllum. E. S. Bastin. (*Amer. Journ. Pharm.*, September, 1894, 417-424.) A cross-section of the rhizome made at some point between the swollen nodes shows a large pith, a circle of wood bundles, the members of which are but little longer in the radial than in the tangential direction even in old rhizomes, a rather thick cortex consisting mostly of parenchyma, but with occasional small vascular bundles and a thin layer of not very well-developed collenchyma beneath the epidermis or the corky layer which takes its place. The bundles in the circle are not equidistant. Some are quite isolated from the rest, being separated laterally from the adjacent ones by broad layers of parenchyma, while others are crowded together in twos, threes, or fours, with very narrow layers of parenchyma between. Some also are quite large, others relatively small, and some, especially the smaller ones, are a little exterior to the main circle. The number of bundles may be as many as thirty-six, the average not exceeding twenty.

The aerial portion of the stem possesses a structure different from that of the rhizome. The bundles, instead of being arranged in a circle, are scattered without apparent order through the stem as they are in the stems of monocotyledons, thus showing a remarkable deviation from the dicotyledonous type.

The cork cells of the rhizome are formed by the tangential division of the exterior layer of collenchyma cells. Only a few tiers of cork cells are formed, usually three or four, before the epidermis ruptures, and after this the thickness of cork does not increase, the scaling off at the surface keeping pace with the growth from within. The parenchyma tissue of the rhizome

shows no special peculiarities. The cells are throughout heavily charged with starch grains. The vascular bundles are the only portions of the structure which contain woody tissues, and this is almost confined to the ducts of the xylem. These ducts are of moderate size, rather loosely arranged with soft tissues between, and occurring singly or in groups of a few. The smallest are in the inner part of the bundle, and nearly all are either reticulate or scalariform, the one form passing into the other. An occasional spiral duct of small size is found in the inner part of the bundle. The other tissues of the xylem consist chiefly of wood parenchyma, no wood cells being developed. In the phloem of the bundles are seen sieve tubes of moderate size, and companion cells along with other parenchymatous elements. In old rhizomes many of the cells of the phloem are found with broken walls and variously wrinkled. No distinct sheath is traceable about the bundle. The outer part of the phloem sometimes shows a few cells of rather large diameter having somewhat thickened and woody walls. These, when viewed in longitudinal section, are found to consist each of a single row of elongated cells, which together resemble a bast fibre in appearance. They are probably to be regarded as imperfectly developed bast fibres. The cells contain starch, though not so abundantly as the adjacent parenchyma cells of the cortex. These fibres, however, do not occur in all the bundles.

Several roots were examined with reference to the structure of the central radial bundle. The number of xylem rays was found to vary between three and six, the commonest number being five or six. The central part is sometimes wholly parenchymatous and sometimes contains scattered ducts. The endodermal sheath is composed of quite regularly arranged cells, all somewhat elongated in a tangential direction, and having the radial walls a little darker in colour. The pericambium, immediately within the endodermis, is composed of somewhat larger cells, also somewhat elongated in a tangential direction. The ducts only are woody.

The starch of podophyllum is very abundant and generally consists of simple granules spherical or nearly so in shape, though some show one or more flat faces, indicating that they have formed a part of a compound granule. Many of the larger ones appear more or less lobulated, and some of those which are spherical show radial markings extending from the centre to near the circumference; these are in reality compound grains. The hilum is central, and the polarization cross is therefore rectangular.

No special secretion cells and no intercellular secretion reservoirs

to a description of a wood section of a supposed specimen of *Bragantia wallichii*, published by Dr. M. T. Masters about 20 years ago, and observes that this description points to a plant differing from the one now discussed by him. The allusion to this subject has called forth communications from Dr. Masters, J. R. Jackson, and E. M. Holmes (*Pharm. Journ.*, 3rd series, xxv. 290 and 310), in which it is shown, by reference to a paper by Dr. Solereder and otherwise, that the stem described 20 years ago by the first-named of these correspondents did not belong to a *Bragantia*, nor even to a member of the *Aristolochiaceæ*, but that it was the produce of a *Gnetum*, probably *Gnetum scandens*.

Note on the Active Constituent of Pellitory (*Anacyclus Pyrethrum*). W. R. Dunstan and H. Garnett. (*Proc. Chem. Soc.*, No. 145.) The similarity in the physiological effect produced by *Piper ovatum* and by *pellitory* (*Anacyclus pyrethrum*) led the authors to examine the latter, the activity of which is usually ascribed to a resin. The authors have separated from this resin a crystalline, intensely active substance which they name *pellitorine*. In most of its chemical and physical properties it closely resembles piperovatine; but so far it has always exhibited certain small differences which may possibly disappear when the substance has been further purified. Both piperovatine and *pellitorine* appear to be pyridine derivatives, but neither possesses any appreciable basic power.

Structure of *Veratrum Viride*. E. S. Bastin. (*Amer. Journ. Pharm.*, April, 1895, 196–203.) The rhizome of *Veratrum viride* is fleshy, upright or oblique, obconical, one and one-half to three inches long, and one to one and a quarter inches thick at its upper end, and densely covered with somewhat fleshy, simple roots, about one-twelfth of an inch thick and from six to ten inches long. Those toward the somewhat truncate lower end of the rhizome are dead, or, in older rhizomes, even withered away, leaving rounded scars. In the fresh state the roots are white, the older ones closely and irregularly wrinkled, while the younger ones are nearly smooth; but in the dried form the colour is yellowish or yellowish-brown, and all the roots are much shrivelled and wrinkled.

The central radial bundle of the roots shows from eight to fourteen rays, with conspicuously large scalariform ducts at the inner ends of the xylem rays, and very small ones at the exterior ends. The cells of the endodermis have their outer walls thin, but those of its cells which come opposite the phloem masses are

conspicuously thickened in their inner and radial walls. Those opposite the ends of the xylem rays are usually but slightly thickened.

The rhizomes in the dried forms are dark brown, or blackish, externally, usually crowned at their upper end with the remains of the solid above-ground stem, ensheathed by the numerous thin, tunicated leaf-bases. To facilitate drying, they are commonly split in a longitudinal direction, into two or more wedge-shaped or flat pieces. The fracture is short, and the colour, internally, whitish. The cross-section shows a distinct cylinder sheath forming an irregular dark line between the central cylinder and the thickish cortex. The bundles are of the concentric type, with a small central phloem surrounded by two or three layers of small-sized scalariform ducts and tracheids, and these are bounded externally by an endodermis. The ducts and tracheids are irregular in form and direction in the bundle. The bundles also pursue a very irregular course in the rhizome, so that a cross-section cuts some of them transversely, others longitudinally, and still others obliquely, giving rise to the appearance of numerous irregular brownish dots and wavy lines, imbedded in the whitish parenchyma. In the cortex, the wavy lines and dots are also present, but less numerous, and towards the outside are seen the sections of the root-bundles near their origin. Owing to the peculiar course of its bundles, the appearance of the longitudinal section of the rhizome is not very unlike that of the transverse section. The parenchyma of both roots and rhizome is rich in starch, and there are also in both scattered cells containing bundles of needle-like raphides.

The starch grains are very small, more or less spherical, single or compound, and with a central and often fissured hilum; the compound grains consist of two, three, or sometimes a larger number of easily separable component granules. Stratification lines are only recognized with difficulty, even in the largest grains.

In conclusion the author states that he has in one instance observed the fraudulent substitution of the rhizome and rootlets of *Symplocarpus foetidus* for those of *Veratrum viride*. They are usually longer than the latter, have a thicker cortex and smaller starch grains, as well as a characteristic foetid odour.

Hydrastis Canadensis. J. Pohl. (*Bibliotheca Botanica*, No. 29. From *Pharm. Journ.*) *Hydrastis canadensis* (Golden Seal) flourishes in moist and shady woods in North America, and perishes

when the woods are cleared. Seeds planted in the spring germinate in May, and produce seedlings with a dull yellow tap-root and deep yellow hypo-cotyledonary stem. In the second year, four or five alternate cataphyllary leaves are developed, and also three foliage leaves, of which, however, only one is fully expanded. During the following years the plant continues to grow in a similar manner until the aërial axis finally produces a terminal flower at its apex. In this stage the plant possesses a rhizome with four or five cataphyllary and short internodes. In the axils of these leaves buds are formed, of which the third one usually develops into a branch, which may either flower in the following year or may continue for some years to produce foliage leaves only. Branches may also be formed by adventitious buds on the roots.

The fresh rhizome is about two inches long and a quarter of an inch thick, branching, provided with numerous roots on its sides and lower surface, and deeply constricted at intervals into segments, each of which represents a year's growth. In the depressions the remains of the fibro-vascular bundles of the foliage leaves can be observed, whilst the minute rings on the segments themselves are the scars left by the cataphyllary leaves.

In the fresh root (both in primary and secondary tissue) the berberine is contained exclusively in the vacuoles of the cells of the hypodermis and endodermis, and those of isolated parenchymatous cells lying closely applied to the xylem bundles; the vessels contain no berberine. In the rhizome the parenchymatous cells with berberine are extremely abundant immediately below the cork cambium and in the cortical parenchyma; they also occur scattered round the vessels. In the aërial axis the berberine is mostly confined to axially elongated parenchymatous cells near the fibrovascular bundles.

On anatomical grounds exception is taken to the opinion of Prantl that the genus *Hydrastis* is allied to *Pæonia*; it is more nearly allied to *Thalictrum*, as they both contain berberine, form a perennial rhizome, possess a caducous perianth, and show similarity in other respects.

The drug consists of the entire plant, with the exception of the foliage leaves and part of the aërial axis; it contains rhizome, root, cataphyllary leaves, and part of the aërial axis. The anatomical characters are identical with those of the fresh drug, but the localisation of the berberine is abnormal, inasmuch as it has permeated nearly the whole of the tissue.

Of all the substitutions, the rhizome of *Jeffersonia diphylla* alone bears some similarity to *Hydrastis*. It is easily distinguished by the stone cells which occur in groups in the cortex, and as a ring in the petioles, and by the absence of cells containing berberine.

Pharmacological Investigation of Manaca Roots. J. Brandl. (*Zeitschr. Biol.*, xxxi. 251-292.) The substances separated were manacin, $C_{22}H_{33}N_2O_{10}$, manacein, $C_{15}H_{25}N_2O_9$, a fluorescent substance identical with the æsculetin of Zwenger (*Liebig's Annalen*, xc. 63), valeric acid, and a material resembling humous substance. Lenardson (*Inaug. Diss.*, Dorpat, 1894), who has worked at the same plant, gives the formula for manacin as $C_{15}H_{23}N_4O_5$. Manacin is convertible into manacein by the action of certain micro-organisms. In addition to botanical details, the bulk of the research refers to the physiological actions of manacin, the most marked of which is a stimulating action of the motor end plates and of secreting glands. Manacein causes very similar results.

Structure of Cimicifuga. E. S. Bastin. (*Amer. Journ. Pharm.*, March, 1895, 121-128.) The author has examined the structure of the rhizome and roots of *Cimicifuga racemosa* (*Actæa racemosa*). The cross-section of the rhizome or of its branches, when stained by aid of phloroglucin and hydrochloric acid to reveal distinctly the wood wedges, shows that the latter are rather short, irregular in size, and placed at unequal distances apart around a large central pith. The vascular bundles are usually considerably narrower than the medullary rays which separate them, and the bark is rather thick. A longitudinal section stained in the same way shows the bundles to be also irregular in their course, and that adjacent bundles frequently send out anastomosing branches. The parenchyma both of the rhizome and roots contain, if the drug is gathered in autumn, a considerable quantity of small starch granules, which are mostly simple and either rounded or somewhat angular, with a central or subcentral, not usually conspicuous hilum, and only rarely showing concentric markings. Many of the grains, however, are compound, consisting of aggregations of two, three, or more.

If a root-section be made a little way back of a root-tip, another near its middle, and a third near its base, the primary structure of the central bundle and the secondary changes it undergoes may be easily traced. The primary bundle is usually tetrarch or possesses four xylem rays, but is sometimes triarch or pentarch. A young portion of the root shows but little secondary changes,

but as these changes progress further, the whole bundle is much increased in size by growth in the endodermis, in the pericambium, and particularly in the cambium zone. The inner ends of the xylem rays grow by the formation of new ducts until the bases of some of the adjacent rays appear to coalesce. The phloem masses also increase considerably in size by new growths on their inner face. Finally, the bundle in the old or mature portion is observed to be enormously increased in size, and most conspicuous among the structural changes observed is the formation, between each pair of primary xylem rays and back of each phloem mass, of a large xylem wedge, so that the arrangement of the xylem elements now present the form of a Maltese cross. Alternating with the arms of this cross may be seen four broadly wedge-shaped medullary rays (also secondary formations), the thin inner end of each wedge resting upon one of the original xylem rays. The number of secondary xylem wedges and of medullary rays corresponds to the number of xylem rays and of phloem masses in the primary radial bundle.

The root thus affords the best characters for the identification of the drug. Excellent woodcut illustrations of the foregoing descriptions will be found in the *American Journal of Pharmacy*.

The Rhizome of *Geranium Maculatum*. E. S. Bastin. (*Amer. Journ. Pharm.*, November, 1894, 516-522.) This plant is popularly known as Cranesbill, and is common in open woods and fields, especially in clayey soil, throughout the northern United States as far west as the States bordering on the Mississippi River, and as far south as Tennessee; but it is rare in the Gulf States, and does not occur in the Rocky Mountain and Pacific Coast floras. The rhizome, which is the part employed in medicine, is from two to four inches long, one-fourth to three-fifths of an inch thick, often branched, bent and strongly tuberculate, dark purplish-brown externally and light purplish-brown internally. When dried, it is wrinkled longitudinally, and breaks with a short, non-fibrous fracture. The roots attain a diameter of about one twenty-fifth of an inch at their base, and may spring from any part of the surface of the rhizome, but more abundantly from the sides and lower surface. They may attain a length of five inches, but average somewhat shorter. When dry they are brittle, and in commercial specimens of the drug only the bases of the roots are found present on the rhizome. Both the rhizome and roots are without odour, and possess a purely astringent taste.

The author gives the results of a structural examination of the

rhizome, accompanied by woodcut illustrations. A transverse section of the rhizome shows a large pith, a distinct cambium zone, which is seldom circular, approaches much nearer the surface at some points than at others, and connects a few vascular bundles that are usually situated at very unequal distances apart. The phloroglucin test shows no woody tissues, except in the xylem of these bundles, and here only the vasiform tissues are stained, no wood-cells being developed. The inner layer of the bark shows no evident radial structure. The outer bark is composed of a thin layer of cork made up of cells considerably elongated in a tangential direction. The exterior of this layer is rough and irregular by reason of the scaling away of the outside tiers of cells.

Starch abounds in the parenchymatous tissue of rhizomes gathered in the autumn, while in those collected in spring it is found to have mostly, and sometimes wholly, disappeared. The granules are smooth, ovate, with the hilum located near the larger end, and surrounded by a number of rings. The arms of the polarization cross are very unequal. The granules are rarely double, and the largest of them are about $\frac{1}{100}$ th of an inch in length.

Tannin may be readily recognized by treating sections under proper conditions with a solution of ferric chloride.

The xylem portion of the vascular bundles is made up chiefly of small-sized scalariform tracheids and parenchymatous elements.

A cross-section of the root usually shows a diarch radial bundle, and although the root early undergoes secondary changes, the diarch character of the bundle remains easily recognizable, and imparts a characteristic appearance to the structure.

Heuchera Americana. E. S. Bastin. (*Amer. Journ. Pharm.*, October, 1894, 467-473.) This plant occurs in rocky, wooded regions from Connecticut to North Carolina, and as far west as Minnesota and Illinois. It is popularly called alum root on account of its very marked astringency. It has a local reputation in diarrhœa and other disorders for which astringent remedies are generally employed.

The rhizome is fleshy, one-half or three-fourths of an inch thick, tuberculate, and often pitted, from two to four or five inches long, giving origin on its upper surface and sides to several short heads, which are cylindrical, scaly from the numerous remaining leaf-bases, and often terminated by a concave stem-scar; from the sides and lower surface of the rhizome are emitted numerous roots, many of which are thin, but some of which may in the fresh state be as much as one-third of an inch in diameter.

The author's paper contains a structural description of sections of the rhizome and the root, as well as woodcut illustrations of the same, for which the original should be consulted.

The most important constituent of the drug is tannin, to which it owes its effects. It belongs to the class of tannins forming blue-black precipitate with ferric salts.

Reseda Odorata. J. Bertram and H. Walbaum. (*Journ. prakt. Chem.* [2], 1. 555-561.) The root of the mignonette (*Reseda odorata*) yields a volatile oil which smells of radishes, has a light-brown colour, a sp. gr. of 1.067 at 15°, and a rotation of +1° 30' in a 100 mm. tube. It proves to be phenylethylthiocarbimide. The authors have synthesized this body, and find that the product agrees in its reactions with the oil of mignonette root.

Constituents of the Root of Corydalis Cava. J. J. Dobbie and A. Lauder. (*Proc. Chem. Soc.*, No. 143.) Compare also *Year-Book of Pharmacy*, 1894, 57 and 135. The authors supply further information respecting the alkaloids "corydaline" and "corybulbine." The latter is extracted from crude commercial corydaline by dissolving hydrochloric acid, and re-precipitating the corydaline with an excess of sodium hydrate. The filtrate is then saturated with carbonic anhydride, which causes the corybulbine to separate out. Another process consists in repeatedly exhausting the crude material with hot alcohol, which dissolves out the greater part of the corydaline. The residue is dissolved in a large quantity of boiling alcohol, from which the corybulbine separates on cooling as an exceedingly fine crystalline powder. It is purified by conversion into the hydrochloride, which, after repeated recrystallization from water, is decomposed by ammonia.

Corybulbine, $C_{21}H_{25}NO_4$, is nearly insoluble in water, soluble with difficulty in methyl and in ethyl alcohol, and insoluble, or nearly so, in ether. It dissolves readily in carbon bisulphide, chloroform, and hot benzene. It is also soluble in solutions of the caustic alkalies. An alcoholic solution of the alkaloid rapidly reduces a warm solution of silver nitrate. When heated, corybulbine softens at 210°, but does not melt till 238°-240°. A solution of the alkaloid in chloroform is dextro-rotatory.

Corydaline has a specific rotation of +311°. It is probably an alkaloid of the same type as papaverine, narcotine, and hydrastine, containing an isoquinoline and a benzene nucleus, but of simpler constitution than these bases, inasmuch as the two nuclei appear to be united directly to one another, and not through an intervening carbon-atom.

A number of compounds and derivatives of both corydaline and corybulbine are described in the paper.

Further Observations on the Structure of *Sanguinaria Canadensis*. E. S. Bastin. (*Amer. Journ. Pharm.*, January, 1895.) In supplementing his previous report on this subject, the author states that the red or orange-coloured secretions found in the rhizome are chiefly contained in distinct cells, which are either isolated or connected into irregular chains and distributed among the parenchymatous tissues of the middle bark and large pith. But in the inner portion of the middle bark, and in the inner bark, chains of cells occur which are longer, more regular, and contain a yellow rather than an orange-red secretion. The cells composing the chains are much narrower and more elongated than the ordinary secretion cells. Generally there is no apparent communication between the cells of these rows, the transverse partitions between the cells being imperforate. In a few instances, however, particularly in the inner layer of the bark, there is a demonstrable connection between the secretion cells of the chains, which thus form a true lactiferous tissue, essentially like that occurring in many other of the *Papaveraceæ*, though much less complex in its development. These milk-tubes are rarely more than a dozen cells long, and not generally branching. The form of laticiferous tissue called "complex," or "reticulate," is only observed in the most rudimentary stages of its development. The secretion cells contain resins as well as alkaloidal principles, as is readily evidenced by tests, and it seems probable that the salts of sanguinarine are more abundant in the large orange-red secretion cells of the pith and outer portion of the middle bark, while those of the closely related alkaloid, chelerythrine, are more abundant in the smaller yellow cells and laticiferous tubes of the inner bark and inner portion of the middle bark. Woodcut illustrations will be found in the original paper.

***Asarum Canadense*.** E. S. Bastin. (*Amer. Journ. Pharm.*, December, 1894, 574-580.) The rhizome and rootlets of this plant are employed in medicine. The former is from 5 to 6 mm. in diameter when fresh, from 10 to 20 cm. long, whitish externally and internally, but when dried they average considerably thinner, finely wrinkled, brown or purplish-brown externally, and whitish or brownish internally. The fracture is short, the zone of wood rather thin, surrounding a large pith, and is composed of from ten to fourteen short, wedge-shaped vascular bundles, arranged in a single circle and rather widely separated from

each other. The bundles are frequently quite unequal in size and placed at unequal distances in the circle. The phloem portions of the bundles contain no fibrous elements, and the xylem portions usually no woody ones except the tracheary tissues, which consist mostly of spiral and scalariform ducts and tracheids of small or moderate calibre. The circle of bundles is bounded externally by a zone of parenchymatous cells considerably smaller than those of the cortex exterior to them, constituting a cylinder-sheath, a structure not often seen in the rhizomes of dicotyledonous plants. The epidermis has hairs attached to it, each of which consists of several elongated cells arranged in linear series. Beneath the epidermis are several layers of collenchyma cells, which in transverse section are usually tangentially elongated. The cells show a tendency to fissure along the thickenings in a tangential direction. In the thick cortical parenchyma and in the pith occur scattered oil-cells, easily identifiable in the sections after treating them with solution of alcannin. Unless stained, they differ little in appearance from ordinary parenchyma cells, save in the absence of starch. In the ordinary parenchyma, both of the pith and the cortex, starch is abundant. The grains are sometimes simple, but oftener double, triple, or in multiple aggregations. The hilum, which is sub-central, is inconspicuous and seldom fissured, and the grains show no distinct stratification curves.

The roots, which attain about a millimetre in diameter, have a thick cortical parenchyma, consisting mainly of starch-bearing cells, among which, however, are sprinkled a few oil cells. The central radial bundle, which commonly has a diameter slightly less than the thickness of the cortex, is usually tetrarch or pentarch, and undergoes few secondary changes. The central part of the bundle usually remains pithy, and its cells contain fine-grained starch.

The Bark of *Betula Lenta*. A. Schneegans and J. E. Gerock. (*Archiv der Pharm.*, 1894, ccxxxii. 437-444.) The authors have re-examined this bark in order to verify the existence therein of the glucoside gaultherin which W. Procter, jun., stated to have obtained from it in an impure state in 1844. In extracting the bark they found that even with 94 per cent. alcohol partial hydrolysis of the glucoside took place, the odour of methyl salicylate becoming apparent. They were able, however, to prevent this decomposition by using for extraction a solution of lead acetate in strong alcohol.

Gaultherin, $C_{14}H_{18}O_8 + H_2O$, crystallizes in colourless needles, which are easily soluble in glacial acetic acid and in alcohol, slowly but freely in water, and almost insoluble in ether, chloroform, benzene, and acetone. The aqueous solution does not affect iron salts, nor does it affect Fehling's solution in the cold, but at 100° cuprous oxide is at once precipitated. Strong sulphuric acid dissolves the glucoside, forming a pale red solution, which rapidly darkens and decomposes. When the dry glucoside is heated, the odour of methyl salicylate becomes apparent at about 100° C., and the substance blackens and decomposes at 120° . The aqueous solution has a bitter taste and is laevorotatory. The glucoside is decomposed by mineral acids, by alkalies, or by heating the aqueous solution at 130° – 140° , yielding a carbohydrate and methyl salicylate.

Assay of the Bark of *Punica Granatum*. W. Stoeder. (*Chem. Centr.*, 1894, i. 606, from *Ned. Tydschr. Pharm.*, vi. 39–44.) The author confirms the accuracy of Gehe's process of extracting the bark with a mixture of ether, chloroform, and ammonia, dissolving the crude alkaloids in excess of standard sulphuric acid, and titrating back with an alkali. The average yield he has obtained from the root bark is 1.0 per cent., but considerably less from the stem bark. Gehe gives 0.3 per cent. as the average yield.

Constituents of True Coto Bark. O. Hesse. (*Liebig's Annalen*, 1894, cclxxxii. 191–207. From *Journ. Chem. Soc.*) The coto bark employed by Jobst and Hesse was derived from Bolivia, whilst nowadays the term has been extended to include varieties from Venezuela and Brazil. The following results were obtained with the bark from Bolivia:—

Cotoïn extracted from this bark is identical with that obtained from other varieties. *Benzoylcotoïn* is formed by the direct action of benzoic anhydride, and crystallizes in compact lustrous prisms, melting at 110° – 112° . It gives a brownish-red coloration with ferric chloride. *Dibenzoylcotoïn* is best prepared by the action of benzoic chloride on cotoïn, and crystallizes in concentric groups of small needles, melting at 134° – 135° . Hydrocotoïn only yields one *benzoyl*-derivative, which crystallizes in white needles, melts at 113° , and gives no coloration with ferric chloride.

The substance known as dicotoïn has the formula $C_{25}H_{30}O_6$, and not $C_{44}H_{54}O_{11}$ as formerly supposed. The cryoscopic determination of the molecular weight, however, gives the number 214, instead of 416, as required by the above formula. This is explained by the fact that dicotoïn is in reality a mixture of cotoïn

with a substance which has the composition and molecular weight corresponding with the formula $C_{11}H_8O_2$, and may be obtained from dicotoïn by adding ferric chloride to its alcoholic solution and evaporating. The iron compound of cotoïn is thus formed, whilst the new substance crystallizes out in long needles. It separates from light petroleum in colourless, strongly lustrous plates, melts at 60° – 61° , and volatilises at a higher temperature. It gives no coloration with ferric chloride. With phenylhydrazine, it forms a compound of the formula $C_{23}H_{22}N_4O$, which crystallizes in colourless needles, melting at 194° . In all its properties, it bears a very close resemblance to phenylcoumalin; as, however, the latter melts at 68° , the identity of the two cannot be considered as proved.

Pseudodicotoïn, $C_{25}H_{20}O_7$, is also a mixture of cotoïn with a substance of the formula $C_{11}H_8O_3$, which the author terms *hydroxyphenylcoumalin*; this crystallizes from light petroleum in colourless plates or white needles, and melts at 61° . Acetic anhydride converts it into *acetoxypheylcoumalin*, $C_{11}H_7AcO_3$, which crystallizes in lustrous needles and melts at 65° . With phenylhydrazine, it forms a compound, $C_{23}H_{22}N_4O_2$, crystallizing in flat needles and melting at 193° .

The paracotoïn obtained from the specimens in question agreed in properties with that previously described.

Constituents of Pereiro Bark (*Geissospermum Vellozii*). M. Freund and C. Fauvet. (*Liebig's Annalen*, cclxxxii. 247–267.) A preliminary investigation of the so-called geissospermine, manufactured by Trommsdorff, showed that this compound was not identical with Hesse's geissospermine. Hesse believes that Trommsdorff's base is identical with a third alkaloid previously isolated by him from pereiro bark. There are, however, on the market, two sorts of pereiro bark: a thin, bast-like variety and a thicker kind; it is from the latter that Trommsdorff prepares his alkaloid. Hesse has not stated which of the two varieties he worked with. The authors now propose the name *vellosine* for Trommsdorff's base, and *apovellosine* for the amorphous base obtained from it. The composition of the former corresponds to the formula $C_{23}H_{28}N_2O_4$, and that of the latter to $C_{46}H_{54}N_2O_7$. Vellosine is toxic, the lethal dose being 0.15 gram in the case of rabbits; death occurs by the weakening of the respiratory centre. An account of its physiological action is given in the paper, as well as a description of several salts and derivatives of both alkaloids.

Pereiro Bark. O. Hesse. (*Liebig's Annalen*, cclxxxiv. 195, 196.) Referring to a recent paper by Freund and Fauvet (preceding abstract), the author states that he has not met with a second variety of pereiro bark, and is of opinion that the source of vellosine cannot strictly be regarded as such.

Rubus Villosus. H. Harms. (*Amer. Journ. Pharm.*, December, 1894, 580-588.) Reports of analyses of blackberry bark (*Rubus villosus*) by G. A. Krauss have been published in the *American Journal of Pharmacy*, 1889, 605, and 1890, 161.

The author's present research was undertaken with the object of further investigating the glucosidal principle and the tannin occurring in this bark. The former is found to correspond with the "villosin" described by Krauss, and is probably one of the saponins. It yields villosic acid as a decomposition product. The tannin is described as dark brown in colour, faintly odorous, readily soluble in water or alkaline solutions, sparingly soluble in ether or acetic ether, and insoluble in acetone or benzol. The proportions of tannin, moisture and ash of the fresh bark, and also the amount of tannin in the thoroughly dried drug, are given in the following table:—

Sample.	Ash.	Moisture.	Tannin in moist drug.	Tannin in absolutely dry drug.
I	3.68	9.86	13.46	14.93
II	4.53	8.78	10.84	11.89
III	4.56	45.15	10.37	18.91
IV	3.87	38.44	10.72	17.42
V	4.31	9.22	12.74	14.03

Constituents of Toddalia Aculeata and Evodia Meliæfolia. A. G. Perkin and J. J. Hummel. (*Proc. Chem. Soc.*, No. 150.) *Toddalia aculeata* is an Indian plant belonging to the *Rutaceæ*. Its root-bark is stated to possess valuable medicinal properties, and is used in Madras as a yellow dye-stuff. The authors find it to contain berberine, contrary to the statement of Flückiger and Hanbury, who were unable to detect this alkaloid.

Evodia meliæfolia, belonging to the same natural order, is a tree growing in China and Japan, whose bark is largely employed in medicine and in dyeing. The authors confirm previous statements that the bark contains berberine.

Comparative experiments on wool indicated that *Evodia* and

Toddalia bark possess the same tinctorial power as a 3 per cent. solution of berberine hydrochloride.

Cassia Stalks in Powdered Cinnamon. R. Pfister. (*Forschung's Berichte*, i. 540. From *Pharm. Journ.*) The author observes that of late years the quality of the lower grades of cinnamon bark and of powdered cinnamon, which is largely produced from the broken bark and siftings of such grades, has been very low. An attempt at improvement has recently been made by adding to such cinnamon the stalks of cassia buds, which possess an unusually powerful odour of cinnamon. In the powdered drug such an admixture can be recognised by the small conical thick-walled hairs, long sclerenchymatous cells with large lumen, and the small spiral vessels. The author considers that such addition of cassia stalks to powdered cinnamon is admissible, inasmuch as, by the comparatively large proportion of volatile oil they contain, they tend to raise rather than lower the quality of the powdered drug.

A New False Angustura Bark. J. Barclay. (*Chemist and Druggist*, February 23rd, 1895.) On two separate occasions during the year 1894 parcels of bark supplied as *Cusparia* were found upon examination to be a substitution. This fictitious drug is described as follows:—It forms flat or slightly incurved pieces of varying length and width, and from $\frac{1}{16}$ to $\frac{1}{8}$, or rarely as much as $\frac{3}{8}$ of an inch, in thickness. The outer surface is of a grey-brown colour, rough from the presence of many wart-like excrescences of the periderm, and frequently bearing closely adherent lichens of a yellow or yellowish-red colour, marked with numerous black spots; beneath the corky layer the colour is dark greenish-grey. The inner surface is coarsely striated longitudinally, and yellow, yellowish-brown, or brown in colour. Fracture hard, brittle, showing numerous closely adherent concentric laminæ. A transverse section under the microscope shows numerous concentrically arranged large groups of sclerenchymatous cells. No chemical examination of the bark has been made.

Constituents of Quassia. E. Merck. (*Merck's Bericht* for 1894, 18.) Quassia wood contains, in addition to quassin, a new constituent, *quassol*, which the author has separated from impure quassin by means of ether, and which strikingly differs from the latter by its freedom from bitterness. It forms white flakes fusing at about 150° C., and is quite insoluble in water, but soluble in ether and chloroform, and slightly so in alcohol.

Presence of Vanillin in Guaiacum Wood. A. Schneegans. (*Journ. d. Pharm. f. Els. Lothr.*, 1895, 62.) The author has isolated a small proportion of vanillin from this wood. He does not regard its presence as surprising, since the wood has a slight vanilla-like odour, and the resin yields on dry distillation guaiacol, which is closely related to vanillin.

Structure of Sassafras. E. S. Bastin. (*Amer. Journ. Pharm.*, June, 1895, 312-318.) A cross-section of the bark of sassafras root which has attained a diameter of two inches or more shows the following structure:—The friable exterior corky layer exhibits the usual microscopic appearance of corky tissue. The thickish middle bark beneath it is rich in oil cells, which on the average are larger than the parenchyma cells among which they are scattered. Oil cells are not confined to this layer, but occur, though somewhat less abundantly, among the sieve and companion cells of the inner layer of the bark. Parenchyma cells, rich in tannic matters, are also freely scattered through the middle and inner layers. The medullary rays, whose course in the bark is usually somewhat wavy, are composed sometimes of one, sometimes of two, and more rarely of three rows of cells. No primary bast fibres are formed in the root bark, and the bark of roots not more than two or three years old is usually destitute of bast fibres of any kind. Later on, however, secondary bast fibres are formed, but these are never so abundant as to give an evident fibrous fracture to the inner layer of the bark.

If the bark be gathered late in autumn or in the early spring, its parenchyma cells, and even the thinnish-walled wood cells and medullary ray cells of the medullium, are found to be heavily charged with starch grains. These are of small size, and, when single, they are spherical or spheroidal in shape, with a central hilum, which sometimes shows a few stratification circles about it. The circles, however, are usually indistinct or wanting. The hilum is usually entire, and appears as a mere point, though sometimes it is angularly fissured. Double and triple granules are more common than single ones, and more complex forms are also observed.

In most structural characters the wood of the root and that of the stem resemble each other closely. They differ chiefly in the conspicuous large-celled pith of the stem, which does not occur in the root at all, and in the fact that in the stem the medullary rays are rather more numerous and inclined to show fewer rows of rays.

The differences between the stem bark and the root bark are more conspicuous. Besides the difference due to the presence of chlorophyll in the middle bark of the former and its absence in the latter, and the difference in cork formation, the stem bark contains clusters of primary bast fibres associated with stone cells, which form an interrupted zone at the junction of the middle and inner barks. Primary bast fibres and stone cells are entirely wanting in the root bark. The secondary bast fibres of the stem are similar in structure and arrangement to those of the root. The volatile oil cells are much less abundant in the stem bark than in the root bark.

Epigaea Repens. E. S. Bastin. (*Amer. Journ. Pharm.*, May, 1895, 231-236.) The author supplies a description illustrated by woodcuts of the stem and leaves of this plant, which is widely distributed over the north-eastern part of North America. For details the original should be consulted.

Chemical Experiments with Datura Stramonium. A. R. L. Dohme. (*Proc. Amer. Pharm. Assoc.*, 1894.) The author arrives at the following conclusions:—

1. That the stems of *Datura stramonium* contain more alkaloid than the leaves.
2. That the plant *Datura stramonium* gathered in June contains less alkaloid than that gathered in July and August.
3. That Keller's method extracts more alkaloid from the drug than Dragendorff's method does.

Constituents of Pinus Picea. C. Tanret. (*Comptes Rendus*, xix. 80-83.) The author's examination of the leaves of this plant shows the presence of a glucoside, *picein*, of the composition $C_{14}H_{18}O_7$, which crystallizes from an aqueous solution with one molecule of water, forming silky, prismatic needles, with a bitter taste, soluble in 50 parts of water at 15° C., very freely soluble in boiling water, slightly soluble in cold and more so in boiling absolute alcohol, and insoluble in ether or chloroform. It fuses, when anhydrous, at 194° C., and is lævogyre. Under the influence of emulsin or dilute acids it yields glucose and *piceol*, $C_8H_8O_2$, which fuses at 109°, and is much less soluble in water than picein.

The glucoside is extracted from the finely chopped leaves by boiling with water containing a small quantity of sodium carbonate, allowing to macerate for 24 hours, then precipitating successively with basic lead acetate and ammoniacal lead acetate, decomposing the latter precipitate by sulphuric acid, neutralising the filtered liquid with magnesia, concentrating by evaporation,

mixing the hot syrupy residue with magnesium sulphate, and extracting with acetic ether. After removing this solvent by distillation, the residual glucoside is purified by treatment with absolute alcohol and subsequent crystallization from boiling water.

Scopolia Carniolica. J. B. Nagelvoort. (*Amer. Journ. Pharm.*, September, 431.) The author's chemical examination of the leaves of a cultivated specimen of this plant was undertaken with the object of ascertaining whether or not they contained scopolamine. The results were entirely negative. He considers it premature, however, to conclude definitely from this isolated case that scopolamine is absent in the species referred to, especially as cultivated plants are known to be very frequently poorer in alkaloid than those growing wild.

Constituents of Cusco Leaves. C. T. Liebermann and G. Cybulski. (*Ber. der deutsch. chem. Ges.*, xxviii. 578-585.) In addition to the "low-boiling hygrine" and "high-boiling hygrine," a third alkaloid has been isolated from Bolivian cusco leaves, which is described as a colourless, oily, optically inactive liquid, of 0.9767 specific gravity at 17° C., and having a composition corresponding to the formula $C_{13}H_{24}N_2O$.

Leaflets and Leaf-stalks of Jaborandi. M. Conroy. (*Pharm. Journ.*, 3rd series, xxv. 981.) Jaborandi as imported contains in addition to the leaflets a considerable proportion of leaf-stalks. The author's examination of both these constituents of the drug shows that the leaflets yielded 22.35, and the stalks 20.3 per cent. of dry extract obtained by percolation with proof spirit containing 0.5 per cent. of hydrochloric acid.

The yield of alkaloid from the leaflets was 0.76 per cent., and that from the stalks 0.37 per cent., or practically one-half of that of the leaflets.

A New Constituent of Coca Leaves. M. P. Romburgh. (*Chem. Zeit.*, xix. 130.) On examining the distillate from coca leaves, the author has detected the presence of small and very variable quantities of methyl salicylate.

Strophanthus Glaber. Dr. Franchet. (*Journ. de Botan.*, viii. 201; *Pharm. Journ.*, 3rd series, xxv. 72.) The author has had an opportunity of examining fruits of a cultivated specimen of *Roupellia grata*, and has been able to confirm his previous opinion that the plant in question is the source of the glabrous *Strophanthus* seeds of commerce. At the same time, he finds that Prof. Baillon is right in suggesting that the genus *Roupellia* must be sunk under *Strophanthus* as a section or sub-genus. Consequently

Strophanthus gratus will be the name in future for the plant yielding these seeds. The author believes, however, that some of this seed may be yielded by the closely allied species, *S. Tholloni*, which has the same geographical distribution, viz., from the Equator to 5° N. lat.

Species of *Strophanthus*. Dr. Franchet. (*Nouvelles Archives du Museum; Pharm. Journ.*, 3rd series, xxv. 253.) The author describes a number of species of this genus, which, in all, now amount to no fewer than thirty-five. His paper comprises notices of *S. boivini*, *S. courmonti*, *S. barteri*, *S. congoensis*, *S. parviflorus*, *S. amboensis*, *S. ogovensis*, *S. bracteatus*, *S. gratus*, and *S. tholloni*, the last two of which are regarded by the author as the sources of the smooth *strophanthus* seed of the Gaboon (preceding abstract).

Constituents of *Piper Ovatum*. W. R. Dunstan and H. Garnett. (*Proc. Chem. Soc.*, No. 145.) *Piper ovatum* is a West Indian medicinal plant growing in Trinidad. When chewed, it gives rise to a tingling sensation and profuse salivation, accompanied by temporary local anæsthesia. The leaves are found to contain a terpene, and a considerable quantity of physiologically active resin, which is also present in the root and stems. From this "resin" the authors have isolated a crystalline, highly active substance, which they name *piperovatine*. Its composition is expressed by the formula $C_{16}H_{21}NO_2$, and it appears to possess an alkaloidal structure, but is, nevertheless, devoid of basic properties. It is nearly insoluble in water and in dilute acids and alkalis, but dissolves readily in alcohol, and the alcoholic solution exhibits the curious property of setting to a "jelly" of very minute crystals when water is added to it.

Piperovatine acts as a temporary depressant of both motor and sensory nerves, and also as a heart poison. It produces a powerful stimulant effect on the spinal cord, causing a tonic spasm resembling that of strychnine. It seems likely to be of service in therapeutics.

***Empleurum Serrulatum*.** J. C. Umney. (*Pharm. Journ.*, 3rd series, xxv. 796, 797.) The leaves of *Empleurum serrulatum* occasionally appear in the port of London, either mixed with or simultaneously with the shipments of *Barosma serratifolia*. When offered for sale by public auction, the drug is generally described in the brokers' catalogues as Buchu. The author quotes from previous publications a description of the leaves, flowers, and fruit of this plant, and gives the results of his analyses of the leaves as well as of those of *Barosma betulina*.

The proportions of extractive yielded by both drugs to various solvents are tabulated below for comparison.

	Barosma betulina per cent.	Empleurum serrulatum per cent.
Loss at 100° C.	13.42	10.4
Mucilage and extractive removed by successive treatment with boiling water. .	36.2	43.4
Volatile oil	1.4	0.64
Petroleum ether extract (principally fatty matter).	5.8	3.9
Ether extract (chlorophyll, etc.)	2.1	2.55
Alcoholic extract	6.91	4.63

The author has also carried out a careful comparative examination of the essential oils of *Empleurum serrulatum*, *Barosma betulina*, *B. serratifolia*, and *Ruta graveolens*, the results of which are embodied in the following table:—

Comparison of Essential Oils of

	Empleurum serrulatum.	Ruta graveolens.	Barosma betulina.	Barosma serratifolia.
Yield of oil	0.64 per cent.	0.17 p.c. (Schimmel)	1.4 per cent.	0.8
Sp. gr. at 15° C.	.9464	.8384	.9579 Liquid portion only	.9615
Exposure to low temperature.	No separation of stearopten	Solidifies	Solidifies	Does not solidify
Solubility in alcohol of 80 per cent. in volume.	Equal volume	Equal volume	Less than equal volume	Equal volume
Range of boiling point	200°–235° C.	200°–240° C.	Liquid portion 205°–210° C.	200°–220° C.
Ferric chloride (presence of phenol or allied bodies)	None	None	Marked re- action (diosphenol)	None

The reaction of the oils with ferric chloride is confirmatory of the absence of diosphenol in the oils of both *B. serratifolia* and *Empleurum serrulatum*.

The foregoing results lead the author to the evident conclusion,

that though the leaves of *E. serrulatum* show certain botanical and chemical affinities with buchu, their use as a substitute for that drug is not permissible as long as their therapeutic value has not been determined by investigation. The leaves may be readily distinguished from buchu by their different odour, their bitter taste, their narrower and generally longer shape than those of *B. serratifolia*, their terminating in an acute point without an oil-duct, and the different appearance of their lateral veins when held up to the light; also by the general presence in the drug of the fruit, consisting of a single, compressed, oblong carpel, terminated by a flat, sword-shaped horn.

Constituents of Nigritella Suaveolens. E. O. v. Lippmann. (*Ber. der deutsch. chem. Ges.*, xxvii. 3409.) The author shows that the flowers of *Nigritella suaveolens* contain small quantities of vanillin, and that a substance similar in odour to heliotropin or piperonal can be obtained from the extract of the plant.

A New Constituent of Artemisia Maritima. E. Merck. (From *Merck's Bericht* for 1894, 3.) From the mother-liquors left after the preparation of santonin from the flower-heads of *Artemisia maritima*, the author has isolated a new constituent, *artemisin*, which corresponds to the formula $C_{15}H_{18}O_4$, and is probably oxy-santonin. It forms small, white, needle-shaped crystals, slightly soluble in hot water, readily soluble in hot alcohol, and fusing at $200^{\circ}C$. Its solution in a small quantity of slightly diluted sulphuric acid, when heated with a drop of solution of ferric chloride, assumes a yellowish-brown colour, while santonin under the same conditions gives a violet coloration.

Adulterated Saffron. F. Ranwez. (*Ann. de Pharm.*, 1895, 6.) The author refers to the adulteration of saffron with crocus stamens, which in the unground drug are so readily recognised by their form and colour, while in powdered samples their detection is less simple and requires a knowledge of the difference between the male and female organs of the flower in their anatomical structure. Attention is therefore called to the characteristic spiral bands which thicken the walls of the large cells forming the inner surface of the anther. The presence of a large proportion of pollen, too, would betray the presence of stamens.

Constituents of Ceanthe Crocata. A. Poehl. (*Chem. and Drugg.*, February 9th, 1895.) The author has isolated from this plant a resinous constituent of the formula $C_{17}H_{22}O_5$, to which the name *ceanthotoxin* is given. It appears to be similar to "cicutoxin" obtained from *Cicuta virosa*.

Constituents of *Rhus Toxicodendron* and *Rhus Venenata*. F. Pfaff and S. S. Orr. (*Pharm. Zeitung*, xl. 339.) The authors arrive at the conclusion that the constituent to which the characteristic action of these species is due is a poisonous non-volatile oil resembling "cardol," with which, however, it is not identical. "Toxicodendric acid," the constituent described by Maisch, is found to be inert.

Lobelia Purpurescens as an Antidote to Snake Poisons. J. H. Maiden. (*Agric. Gaz. of N. S. Wales*, 1894, 474. From *Pharm. Journ.*) This plant has a local reputation as an antidote to snake poison, about three or four ounces of a decoction of the herb being given to the bitten animal. The author has detected the presence of lobeline in the plant.

Poisonous Australian Plants. J. H. Maiden. (*Agric. Gaz. of N. S. Wales*, 1894, 471, 472. From *Pharm. Journ.*) The author directs attention to the poisonous character of species of the genus *Gastrolobium*, which cause much injury to stock in West Australia and Queensland. The species known to have produced fatal results are *Gastrolobium bilobum*, *G. calycinum*, *G. grandiflorum*, and *G. ovalifolium*. Animals that have eaten the leaves are attacked with difficulty of breathing for a few minutes; they then stagger, drop down and die. The raw flesh of animals so killed poisons cats, and the blood kills dogs, but the roasted and boiled flesh is eaten by human beings without inconvenience. Another plant, *Stypandra glauca* (Liliaceæ), is said to cause sheep that have fed on it to go apparently blind, and run into any sort of object. It is abundant in W. Australia (*Agric. Gaz. of N. S. Wales*, 1894, pp. 141-143). In a list of the fish poisons of the Australian aborigines, the author mentions three plants which are not recorded in Dr. Greshoff's list of fish poisons of all countries. One is *Eucalyptus microtheca*, known as Coolibah, or the flooded box, the second is *Luffa ægyptiaca*, known to the natives as Bun-bun, and the third is a *Polygonum* supposed to be *P. orientale*.

Useful Indian Plants. M. Greshoff. (*Bull. Kol. Mus. of Haarlem*, No. 1.) The plants dealt with in this report comprise the following:—*Aleurites moluccana*, *Anacardium occidentale*, *Litsea sebifera*, *Pangium edule*, *Samadera indica*, *Sesamum indicum*, *Euphorbia pilulifera*, *Hydrocotyle asiatica*, *Gaultheria leucocarpa*, and *Parniarium glaberrimum*.

Some Medicinal Products from the Straits Settlements. E. M.

Holmes. (*Pharm. Journ.*, 3rd series, xxv. 1095.) This paper comprises notices of "Biah," "Prual," "Ipoh Aker," "Poko Lulay," and "Buah Kumbong sa Mangkok." For particulars reference should be made to the original.

Some Poisonous Plants of South Africa. J. Medley Wood. (*Pharm. Journ.*, 3rd series, xxv. 275, 276.) *Lasiosiphon anthylloides*.—The roots are very acrid, like Mezereon and other plants of the same order (*Thymelacæ*) to which it belongs. It has bright yellow flowers, in terminal clusters, very conspicuous, and sweetly scented in the evening. Unlike the Mezereon it has ten stamens, and there are five scales alternate with the lobes of the perianth. The roots are said to be used by the natives as an antidote for snake bites, but great caution is observed as to the quantity administered.

Lichtensteinia interrupta.—An umbelliferous plant, the root of which is used by the natives as a remedy for colds. It has the drawback of giving headache.

Combretum bracteosum.—The fruit of this plant is locally known as the "hiccup" nut, and by the natives as "Umtandawa." The plant is a climbing shrub with ovate leaves and terminal spikes of dull red flowers. The fruit is an oblong nut with a pleasant flavour, but causes violent hicough if only a few are eaten. An allied species, *C. erythrophyllum*, known as "Umduba," distinguished by its papery four-winged fruits, and its leaves turning almost white before flowering, but reddish in the autumn, is stated by J. Kirkman to be used as a medicine by the natives in the dose of $\frac{1}{2}$ oz. or less, but an overdose causes death.

Tephrosia macropoda.—This leguminous plant, known to the natives as "Ityozaan," is not uncommon in the colony of Natal. The roots are used for stupefying fish, and for freeing dogs from vermin.

Phytolacca stricta.—In the Cape Colony this is known as the "wild sweet potato." Dr. A. Smith mentions three cases of poisoning by the tubers, two of which were soon relieved by an emetic, whilst one of the victims got into a state of collapse. An allied species, *P. abyssinica*, is used medicinally by the natives.

Acoxinthera venenata.—All parts of the plant are more or less deleterious. It is known to have formed the chief ingredient used by the Bushmen for their arrow poisons. It is stated that in the Transvaal the poison is extracted from the fruit, and that it is more abundant in the seed. The plant is also used by the natives

for snake bites and medicinally in other ways. *A. spectabilis*, which has larger, white, fragrant flowers, and much larger, oval, black fruits, about the size of a cherry, is likewise believed to be poisonous.

Buphane disticha, or *B. toxicaria*.—This bulbous plant, known to the natives as “Incwadi,” has the reputation of being poisonous, and is regarded as one of the ingredients used by the Bushmen to poison their arrows. It has also been used as a remedy for “redwater” in cattle.

Hæmanthus natalensis.—Another bulbous plant, the fruit of which forms a globose red berry, is also reputed to be poisonous. Hemlock, stramonium, and the physic nuts (*Jatropha curcas* and *J. multifida*) are likewise enumerated amongst the toxic plants of the colony.

The Materia Medica of Ceylon. H. Kraemer. (*Amer. Journ. Pharm.*, November, 1894, 530–539.) This report comprises notices of drugs obtained from the following plants:—*Acacia intsia*, *Adenanthera pavonina*, *Adhatoda vasica*, *Ægle marmelos*, *Ærura lanata*, *Aliesomeles ovata*, *Alysicarpus bupleurifolius*, *Atalantia ceylonica*, *Andropogon muricatus*, *Azadirachta indica*, *Barleria prionitis*, *Bassia longifolia*, *Bombax malabaricum*, *Calotropis gigantea*, *Cardiospermum halicacabum*, *Cassia alata*, *Cassia auriculata*, *Cassia fistula*, *Celtis cinnamomea*, *Cissampelos pareira*, *Coscinium fenestratum*, *Cratæva Roxburghii*, *Crotalaria laburnifolia*, *Curcuma longa*, *Cyclea burmanni*, *Cyperus rotundus*, *Desmodium triflorum*, *Dipterocarpus zeylanicus*, *Drega voubilis*, *Eclipta erecta*, *Eleusine indica*, *Epaltes divaricata*, *Evolvulus alsinoides*, *Ficus altissima*, *Gmelina asiatica*, *Hedyotis avicularia*, *Hedyotis vestita*, *Hemidesmus indicus*, *Herpestris monniera*, *Hydrocotyle javanica*, *Ipomœa beladambæ*, *Ixora coccinea*, *Kagia montana*, *Leucas zeylanica*, *Oroxylum indicum*, and *Tinospora cordifolia*.

For details the original should be consulted.

Cactus Grandiflorus. G. Sharp and J. H. Hoseason. (*Practitioner*, liii. 161.) The authors have found that this plant contains a series of resins, one or more of which are soluble in normal saline solutions, and to these they attribute whatever medicinal activity it may possess. Alkaloids and glucosides appear to be absent. Pectin, vegetable mucilage, and small quantities of sugar and starch are found to be present. Pharmacological experiments with the pure resinous extract are described, the results of which seem to indicate that beyond having a slight

diuretic action, *Cactus grandiflorus* is devoid of physiological activity.

A somewhat fuller account of the preliminary analysis of this plant is given by G. Sharp in *Pharm. Journ.*, 3rd series, xxv. 416, 417.

Shepherd's Purse as a Hæmostatic. (*Ann. Chim. Pharm.*, 1894, 303.) Shepherd's purse (*Capsella bursa-pastoris*) is reported upon as a useful hæmostatic, and is administered in the form of a fluid extract in doses of 0·1 to 0·15 gram three times a day. It is recommended as a substitute for *Hydrastis canadensis*. Bursinic acid, its active constituent, has also been employed medicinally, chiefly in the form of an iron compound.

Carissa Ovata. T. L. Bancroft (*Pharm. Journ.*, 3rd series, xxv. 253.) The author has examined a variety of this plant (*C. ovata* var. *stolonifera*), and has extracted from it a crystalline principle which is very bitter, and is apparently a glucoside. The crystals are very soluble in water, less so in dilute spirit, slightly soluble in absolute alcohol, and insoluble in ether or chloroform. Strong sulphuric acid gives no coloration with the crystals, but ammonia gives a yellow colour. Auric chloride and tannin give slight precipitates with the solution of the crystals, but mercuric chloride gives none, nor does potassio-iodide of mercury. The crystals are deliquescent, and when exposed in a thin layer to the air for a few days they assume a green colour. They reduce an alkaline solution of cupric oxide. At first the author suspected that this principle might be identical with ouabaïn, since the genus *Carissa* is closely allied to *Acokanthera*, and the alcoholic extract of the bark rapidly killed frogs when subcutaneously injected, the heart stopping in systole and the muscles being pale and paralysed. He now believes, however, that it is quite distinct chemically. He suggests that the allied species, *C. xylopicron*, which is used in Mauritius in diseases of the urinary organs, might be worth a trial in Europe, the Brisbane plant being scarce.

Constituents of Bocconia Frutescens. J. A. Battandier. (*Comptes Rendus*, June 10th, 1895.) This plant is shown to contain fumarine, a considerable proportion of chelerythrine, a small quantity of a base closely resembling chelidonine, and a new alkaloid for which the author suggests the name *bocconine*. For details the original should be consulted.

Tabernanthe Iboga. (From *Pharm. Journ.*, 3rd series, xxv. 436.) This plant, used by the natives of the Gaboon and Congo, is described and illustrated in the *Icones Plantarum*, Pl. 2337. under

the above name. The root was first sent to Kew in 1883 by Hugo Mueller under the native Congo name of "Bocca root," and was said to be much used, and valued on the Lower Congo as a febrifuge. Baillon says that it is known at Cape Lopez as "Iboga," and that it is the "Abou" of the Pahouins, and the "Obouete" of the Gaboons. The latter people are said to consider it to be intoxicating, aphrodisiac, and to prevent a tendency to sleep. From a botanical point of view it differs from the genus *Tabernaemontana* chiefly in the consolidation of the carpels.

Constituents of Senecio Vulgaris. A. Grandval and H. Lajoux. (*Comptes Rendus*, May 20th, 1895.) The author has extracted from this plant larger quantities of senecionine and senecine, and has studied their properties. Senecine has a very bitter taste. With sulphuric acid it produces a yellow coloration inclining to brown; with nitric acid a reddish-violet coloration as well as a violet precipitate; and with sulpho-vanadic acid a violet-brown colour. Senecionine does not appear to give any characteristic colour reactions. It is less bitter in taste than senecine, and has a composition corresponding to the formula $C_{18}H_{26}NO_6$.

The Poisonous Action of Nutmegs. M. Daschewski. (*Pharm. Zeitschr. für Russland*, 1895, 17.) Cases of poisoning by nutmegs have been frequently reported. The author attributes their toxic action to the essential oil, and states that for medicinal purposes the dose of nutmeg should never exceed 0.3 to 1.25 gram.

Constituents of Nutmegs. W. Bussé. (*Pharm. Wochenschr.*, No. 19, 150.) The author's analyses of nutmegs show the fat to amount to 31.1 to 40.5 per cent., the volatile oil to 8.10, the moisture to 5 per cent., and the ash to about the same quantity, of which only 0.5 per cent. is insoluble in hydrochloric acid.

Assay of Cloves and Mace. W. Lenz. (*Zeitschr. für analyt. Chem.*, xxxiv. 200.) Compare *Year-Book of Pharmacy*, 1894, 189. The author suggests the following improved process for the estimation of volatile oil obtainable from these drugs:—10 to 20 grams of the powder are mixed with water in a 200 c.c. retort, the beak of which is inclined upwards, but at its middle is bent downwards at a right angle and connected with a condenser. 10 c.c. of olive oil are added to prevent frothing, and steam is passed through the mixture as long as any oil distils. The distillate, amounting to about 500 c.c., is saturated with sodium chloride and extracted by shaking with 3 successive quantities (50 c.c.) of ether. The ethereal solution is dried by digesting with 20 grams of fused

calcium chloride for at least three days, and is then evaporated below 30° in a tared flask, through which a current of dry air is passed, until, at intervals of five minutes, its weight becomes constant. The percentage of eugenol in the oil is then determined by Thoms' method. The high solubility of oil of cloves in a 50 per cent. aqueous solution of sodium salicylate led to experiments in which this solution was substituted for water in the retort. The average yield of oil from the water distillations was 17.75 per cent., containing 79.44 per cent. of eugenol; from the salicylate 19.45 per cent., containing 84.52 per cent. of eugenol, the latter yield agreeing better than the former with that obtained on the large scale. Similar experiments with mace, the oil of which is nearly insoluble in salicylate solution, gave one-fourth more oil with the salicylate than with water; and that the action is not due to a mere rise in the boiling point of the solution is shown by the fact that solutions of potassium acetate and of calcium chloride have no such effect. The behaviour of the salicylate seems rather to be due to its peculiar solvent action on the plant tissues, which renders it such a valuable liquid for mounting microscopic preparations.

Assay of Nux Vomica. C. C. Keller. (*Apoth. Zeitung*, viii. 542.) Fifteen grams of the powdered substance are freed from fat by washing with ether in a tube plugged with cotton wool. The ethereal extract, amounting to 100 c.c., contains some alkaloid, which is recovered from it by shaking with 15 c.c. of N/30 hydrochloric acid and washing out the acid with 10 c.c. of water. The exhausted residue is transferred to a vessel of 250 c.c. capacity; ether is added until the whole amount present is 100 grams. 50 grams of chloroform and 10 grams of 10 per cent. ammonia solution are added, and the whole is shaken for half an hour. The acid solution is then added, and again well shaken. When separation is complete, the ether chloroform solution is filtered, and 100 grams of it are evaporated in a tared conical flask. The residue is freed from chloroform, which it obstinately retains, by repeated evaporation with absolute alcohol, then dried at 95° – 100° and weighed. The purity of the alkaloid may be verified by titration, using iodoeosin as indicator. The proportion of chloroform to ether must be accurately observed.

Composition of Kola-Nuts. C. Uffelmann and A. Bömer. (*Zeitschr. für angew. Chem.*, 1894, 710–713.) The authors have determined the constituents in 10 varieties of kola-nut with the following results:—

	Per cent.
Water	13.35
Total nitrogen	1.53
Caffeine (including theobromine)	2.08
Ethereal extract	1.35
Starch	45.44
Tannin	3.79
Cellulose	7.01
Other non-nitrogenous matter	18.21
Mineral matter	2.90

The caffeine was determined by boiling with water containing 5 per cent. of sulphuric acid, and then proceeding according to Mulder's directions. The starch was estimated by first boiling under pressure and then inverting. The ethereal extract, containing a little caffeine, was obtained by 6 or 8 hours' extraction of the finely powdered substance. The tannin was determined by boiling 5 grams with 200 c.c. of water for an hour, then diluting the liquid to 500 c.c., and titrating 200 c.c. of the filtrate by Fleck's method.

Notes on Kola. C. O. Topping. (*Amer. Journ. Pharm.*, October, 1894.) The author has examined six samples of this drug, and determined the tannin, the proportion of total alkaloids, and that of the separate alkaloids (caffeine and theobromine). The results, together with the processes employed, will be found in the original paper (*Transactions of the American Pharmaceutical Association* for 1894). The author has also confirmed the presence in kola of a ferment capable of splitting up the glucoside kolanin into caffeine, glucose, and kola-red.

Piper Clusii. A. Herlandt. (*Acad. Roy. de Méd. de Belgique*, 1894, 115. From *Pharm. Journ.*) The author has contributed to the study of useful plants from the Congo territory, by examining the fruits known as "Poivre de Clusius." He finds that they contain 11.5 per cent. of volatile oil and 5.0 per cent. of piperine, either free or in the form of a compound which is decomposed by solvents. The detection and localisation of the latter body can be best effected, according to the author, by the persistent yellow colour it produces in contact with hydrate of chloral; it exists only in the albumin. In assaying it, the solvent action of sodium salicylate was utilised to separate resinous matters; the amount of piperine thus determined proved to be less than is present in black pepper, but Herlandt thinks they could be used either as a source of piperine, or, if deprived of part of their volatile oil, as a condiment. Although its structure resembles that of cubebs, the fruit is to be classed with the peppers containing piperine.

Composition of Cacao Beans. H. Beckurts. (*Archiv der Pharm.*, ccxxxi. 687-694.) The author has determined the proportions of the chief constituents in 23 trade brands of these beans, and finds the fat to vary from 42.00 to 57.40 per cent., the theobromine from 0.63 to 2.20, the starch from 7.56 to 16.53, and the ash from 2.20 to 3.75 per cent.

With regard to the fat, the melting point was found to vary from 30.0° to 36.5° C., that of the fatty acids from 48.5° to 53.0° C., the saponification number from 193 to 220, and the iodine absorption from 32.8 to 40.0.

Chemical Examination of Commercial Varieties of Cacao. W. E. Ridenour. (*Amer. Journ. Pharm.*, April, 1895, 207-209.) The author's results are embodied in the following tables:—

Weight of Beans.—The determination of the weight of one bean was found by taking the average of fifty beans:—

	Grams.
Bahia . .	.856
Surinam .	1.175
Java . .	.994
Trinidad .	1.295
Ariba . .	1.434
Roasted Trinidad	1.189
Caracas . .	1.447
Granada .	.920
Tobasco . .	1.266
Machalle .	1.237
Maracaybo .	1.364
Roasted Caracas	1.214

Results of analyses.

	Bahia.	Surinam.	Java.	Trinidad.	Ariba.	Caracas.	Granada.	Roasted Trinidad.	Tobasco.	Roasted Caracas.	Machalle.	Maracaybo.	Average.
Fat (cacao butter)	42.10	41.03	45.40	43.68	43.31	38.81	44.11	41.89	50.95	37.63	46.84	42.20	42.90
Theobromine . .	1.08	.93	1.16	.85	.86	1.13	.75	.95	1.15	.99	.76	1.03	.87
Albuminoids . .	7.50	10.54	9.25	11.90	10.14	10.69	9.76	12.02	7.85	12.38	12.69	11.58	10.61
Glucose	1.07	1.27	1.23	1.38	.42	2.76	1.81	1.48	.94	1.76	1.60	1.09	1.40
Saccharose . . .	.51	.35	.51	.32	6.37	1.54	.55	.28	2.72	.51	.46	1.38	1.29
Starch	7.53	3.61	5.17	4.98	1.68	3.81	6.27	5.70	3.51	6.07	1.35	1.69	4.27
Lignin	7.86	3.90	6.10	5.65	4.62	3.28	5.55	5.87	6.44	9.05	5.95	7.16	5.95
Cellulose	13.80	16.24	13.85	13.01	14.07	16.35	13.40	19.64	12.67	11.69	11.32	17.32	14.44
Extractive matter (by difference)	8.99	13.53	8.90	8.31	9.00	12.72	9.72	5.84	9.26	9.22	9.02	6.70	9.30
Moisture	5.96	5.55	5.12	6.34	5.90	6.63	5.28	2.63	1.55	5.69	5.96	5.67	5.18
Ash	3.60	3.05	3.31	3.69	3.73	4.36	2.71	3.70	3.06	5.03	4.15	4.13	3.70

Tea Seed. D. Hooper. (*Pharm. Journ.*, 3rd series, xxv. 587, 588 and 605, 606.) The tea seeds examined by the author were

$\frac{1}{3}$ to $\frac{5}{8}$ of an inch in diameter, rounded or hemispherical, of a chocolate brown colour. A thin, brittle integument enclosed the whitish oily kernel. The brown husks were removed, and the kernels dried in a water-oven, which resulted in the loss of one-third of their weight of water. The dried kernels were reduced to fine powder, and, upon analysis, were found to contain the following constituents :—

	Per cent.
Fixed oil	22.9
Albuminoids	8.5
Saponin	9.1
Carbohydrates (sugar and mucilage)	19.9
Starch	32.5
Fibre	3.8
Mineral matter (ash)	3.3
	<hr/>
	100.0

From the nature and proportion of the individual constituents, the author arrives at the following conclusions with regard to the usefulness of tea seed :—

1. *Tea seed is not suitable for manufacturing a fixed oil.* The proportion of oil in the seed is much smaller than that found in well-known oil-bearers, as sesame, coco-nut, and castor. The oil is difficult to express on account of the emulsifying property of the saponin. The saponin is poisonous, and appears to dissolve to some extent in the oil, which is a damaging feature.

2. *Tea seed should be used as a manure.* The amount of nitrogen is not so high as in many poonacs, but it is higher than the amount contained in farmyard manure, and its application would be beneficial to the tea if beaten into a powder and placed in the ground near the roots of the tea bushes.

3. *Tea seed should be tried as an insecticide.* Insects are known not to attack the seed-cakes of the “bassia” and “neem” or “margosa,” because of the acrid principles contained in them. For the same reason they would keep away from substances containing the poisonous saponin, and would be killed by a strong infusion of the seeds. The seed could be used in two ways, either as a decoction or as a dusting powder. In the first case, the bruised seed should be extracted with boiling water, and then filtered. The clear liquor may then be applied to the plants infested with the pest. Or the seeds may be reduced to fine powder and sprinkled over the plant or near the ground where the insect or blight abounds.

Therapeutic Properties of Zizyphus. (*Kew Bulletin*, 1894, 193.)

An account is given in this paper of some fruits of a shrub inhabiting northern Central Australia, which were collected by L. G. Browne and received at Kew Gardens. They appear to be from a small-fruited species of *Zizyphus*, near *Z. ænophia*, and are stated to be employed by the natives with good effect in cases of diarrhœa. All the species of this genus are supposed to possess astringent properties.

Randia Dumetorum. M. Vogtherr. (*Archiv der Pharm.*, ccxxxii. 489-532.) The fruit of *Randia dumetorum* is in popular use in India, where the plant is known as *Gelaphal*, as an emetic and remedy for dysentery. In addition to the substances described, a minute quantity of an alkaloid was isolated, but not characterised or identified.

Randiasaponin, a glucoside, forms yellowish plates, or a white, amorphous powder, and melts and decomposes at about 250°. It loses 11.4 per cent. of water at 100°; the percentage composition of the dry substance is C, 55.52; H, 8.72; O, 35.76. It is not hygroscopic, but dissolves in water to a neutral solution, which froths readily. It is reprecipitated from this solution by moderately strong hydrochloric or sulphuric acid, and is also thrown down by lead acetate and basic acetate as a gelatinous compound, which serves for its purification. It does not reduce alkaline copper solution, except after prolonged hydrolysis with dilute hydrochloric acid, when it is converted into randiasapogenin and two sugars. The *osazone* of one of these is insoluble in ether, crystallizes in yellow crusts, and melts at 166°-167°, whilst that of the other is soluble in ether and amorphous, and melts at 176°-177°. Randiasaponin, like quillayasapotoxin, has the property of dissolving red blood corpuscles to a clear solution.

Randic acid, $C_{30}H_{52}O_{10}$, appears to be a monobasic acid of the series $C_nH_{2n-8}O_{10}$, characterised by Kobert as the saponin series, and exists, apparently, in loose combination with randiasaponin. It crystallizes from alcohol in white, nodular masses, and melts at 208°-210°. It is sparingly soluble in water and ether, freely in alcohol, acetic acid, and concentrated sulphuric acid; solutions of the alkali salts froth very readily. Randic acid resembles quillayic acid in dissolving red blood corpuscles without destroying the colouring matter, and in precipitating albumins and peptones. To these properties, and the similar property of randiasaponin, the poisonous character of the fruit is probably due.

Randiatannic acid exists in small quantity in the pericarp, and is a brown, very hygroscopic mass, which is freely soluble in ether, as well as in water and alcohol. It gives a green coloration with ferric chloride, and a yellow precipitate with basic lead acetate, and reduces alkaline copper solution.

One of the products of the decomposition of randiatannic acid appears to be *randia-red*, $C_{33}H_{34}O_{20}$, a substance to which the brown colour of the pericarp of the fruit is due; this is precipitated by acids from the alkaline extract as a brown powder, which is insoluble in water, alcohol, and ether, but easily soluble in alkalis. The solutions give reddish precipitates with lead acetate and alum. A brownish-red colouring matter, probably the ammonium-derivative, is precipitated by ammonia from the acid-mother liquor; it forms a harsh mass resembling asphalt, and is soluble in hot water; it is decomposed by caustic soda with evolution of ammonia.

Randia fat is a yellowish-green substance of the consistence of butter; it melts at 28° – 29° , and its sp. gr. is 0.9175 at 20° . The acid number is 13.8; the saponification number, 160.2; and the iodine number, after two hours, 43.24.

Areca Catechu. T. Osenbrüg. (*Inaug. Dissertation, Marburg, 1894. From Pharm. Journ.*) The author has studied the development of the areca nut. The areca palm is crowned with eight or ten leaves, and produces successively three or four inflorescences, which exhibit as many stages of development. The pericarp of the unripe fruit is green, that of the ripe yellowish-red; it encloses the seed, which lies nearer the apex than the base. The pericarp is differentiated into three layers, the outer of which is thin. The middle layer consists principally of fibres, and is permeated by fibrovascular bundles, whilst the inner layer forms a thin but firm shell enclosing the seed; the fruit is therefore to be regarded as a drupe. The fibres of the middle layer consist of bundles of sclerenchymatous fibres, and either accompany the fibrovascular bundles or take a separate course; they frequently anastomose, and thus produce the fibrous toughness of the pericarp. These bundles are accompanied by stone-cells, the number of which increases until the hard inner layer is formed. The pericarp also contains raphides in bundles, and cells filled with a red secretion. The seed is bluntly conical, and possesses on the flat side a small warty excrescence, the mycophyle, which in drying forms a little depression. The testa lies closely applied to the cartilaginous endosperm. The outer layers are mostly lignified and easily

removed; in the ripe seed they are often absent. The inner layers are brown and contain tannin. The cell walls in the endosperm are much thickened, and have few but large areolated pores. The ovule has two integuments; the formation of the rumination commences in the funicular region by the development of masses of tissue in the form of horse-shoes opposite the fibrovascular bundles. Smaller masses are formed opposite to the branches of the fibrovascular bundles. The brown lines seen on a section of the seed consist of cells containing tannin. They are arranged in a layer, two or three cells wide, immediately under the epidermis, and accompany the fibrovascular bundles into the ruminations. The principal alkaloid, arecoline, is not deposited in the endosperm, but in the ruminations; this localisation of alkaloid and tannin is regarded by the author as a protection to the plant.

Cubebs and their Adulterations. A. De Wevre. (*Annales de la Soc. Roy. des sc. méd. et nat. de Bruxelles*, iii.) This paper furnishes an interesting report on the history of this subject and of the results of a microscopical investigation of cubebs and their adulterations. It cannot, however, be satisfactorily dealt with in a brief summary without losing much of its value; and the reader is therefore referred to the original or to a copious abstract accompanied by woodcut illustrations in *Pharm. Journ.*, 3rd series, xxv. 314-316, 757, 758, and 797-799.

Constituents of the Seeds of *Chenopodium Album*. G. Baumert and K. Halpern. (*Archiv der Pharm.*, ccxxxi. 641-644, and 648-653.) The authors' results are tabulated as follows:—

	Baumert and Halpern.		Erismann.	Kapustin.	Salmenew.	Mean.
	Seed.	Husk (Oalyx leaves).				
	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.
Water	10·33	7·45	10·66	17·04	10·92	12·22
Nitrogenous matter .	13·94	12·25	13·88	15·75	17·60	15·29
Fat	6·97	2·86	6·28	5·88	6·93	6·51
Nitrogen-free extract .	39·30	39·66	47·42	37·70	38·52	40·73
Fibre	25·68	17·93	16·52	17·58	21·45	20·31
Ash	3·88	19·85	5·24	6·05	4·58	4·94
Containing proteids .	12·56	9·91	—	—	—	—

The comparatively high percentage of ash, fibre, and fat would

thus seem to afford a means of detecting the presence of these seeds in wheat or rye-flour, in which the ash amounts to about 1·8, the fibre to about 2·0 to 2·6 per cent., and the fat to about 1·75–1·80 per cent. The rose or deep red colour which an alcoholic hydrochloric extract (made by some hours' digestion of chenopodium flour at a temperature somewhat above the normal) exhibits, may also serve for the microscopical detection of the seed.

The alkaloid chenopodine which Engelhard claimed to have isolated from *Chenopodium*, and which Reinsch regarded as identical with leucine, is shown by the authors to be betaïne. The name chenopodine should therefore be expunged from chemical literature. A small quantity of paracholesterol was detected in the ether extract of the seed. Since betaïne is not poisonous, and as there is no indication of the presence of saponin or of oxalic acid, the cause of the toxic action which chenopodium seeds have been repeatedly observed to possess remains still unexplained. The authors point out that the seeds contain a small quantity of an essential oil which has not yet been physiologically tested.

Constituents of Hemp Seeds (*Cannabis Sativa*). S. Frankfurt. (*Landw. Versuchs-Stat.*, xlv. 153, 154; *Ber. der deutsch. chem. Ges.*, xxvii. 769, 770.) A further examination of these seeds has shown that they contain, besides choline, a second base, identical with trigonelline, $C_7H_7NO_2$, obtained by Jahns from the seed of *Trigonella fœnum græcum*, and shown by him to be identical with Hantzsh's synthetically prepared methylbetaine of nicotinic acid. The same base has also been obtained by the author from peas (*Pisum sativum*).

Commercial Linseeds. A. J. Dey and W. B. Cowie. (*Pharm. Journ.*, 3rd series, xxv. 1037.) The following table shows the comparative size and weight of the different varieties of linseed as found in the market at the present time. The largest seeds are placed first in order and the smallest last:—

South American	.	.	466 seeds weigh 50 grains.
Bombay	.	.	495
Turkish	.	.	542
Canadian	.	.	684
Dutch	.	.	692
Russian	.	.	754
English	.	.	823

The Russian sample contained about 1·5 per cent. of foreign

seeds, including a considerable proportion of cruciferous seeds; the Canadian sample contained about 0·7 per cent. of foreign seeds, including a few apparently grass seeds; and a few cruciferous seeds were seen in the Turkish sample. The South American sample contained a quantity of whitish, quartz-like, fairly large-sized fragments of stone; the Turkish sample contained some reddish-coloured sandy matter; and the Bombay sample contained small fragments of blackish, friable earthy matter. None of the samples gave a perceptible pungent odour indicative of cruciferous seeds, though the latter were present in at least two samples. The results of the authors' chemical examination are embodied in the following table:—

Sample.	Starch.	Oil p.c.	Ash p.c.	Insoluble in HCl p.c.
English. . . .	absent	29·5	3·110	0·120
Dutch	„	34·5	1·930	0·144
Turkish. . . .	„	36·5	2·788	0·138
Canadian . . .	present	37·0	3·122	0·030
Russian. . . .	„	39·0	2·718	0·184
South American.	absent	39·5	4·063	0·476
Bombay. . . .	„	40·0	2·377	0·267

The South American and Bombay seeds were large-sized, of excellent quality, very free from foreign seeds, highly farinaceous, and yielding a large percentage of oil.

Assay of Linseed Cake. A. P. Aitken. (*Journ. Amer. Chem. Soc.*, xvi. 114–122.) In estimating moisture by drying the sample in a water-bath, it is generally found several per cent. too low, and this error may impair the estimation of the oil; the common practice being to determine the moisture in one part of the sample and the joint moisture and oil in another portion.

The author has now improved the process by drying the sample, contained in an aluminium boat, at 100° in a current of dry coal gas, previously brought to the same temperature. By this means, oxidation of the oil is prevented. The oil is estimated by introducing the dried sample into an extraction tube, which is closed at the beginning of the elongated end with a double wad of filter paper, and, after any powder adhering to the sides has been brushed down, another wad is patted in on the top. The tube is now inserted in one of the holes of a zinc box, which is filled with warm water. The narrow end of the tube dips into a weighed flask, in case it be desired to check the result by a direct weighing of the oil. Ether

is now poured into the tube, and the tube corked; when the ether begins to boil, it rapidly runs into the flask. The extraction is repeated 15 to 20 times. The contents of the tube are now pushed, by means of a thin glass ramrod, into a weighed aluminium capsule; the wads are cleaned with a camel-hair brush, and, after drying the exhausted powder for a short time at 100°, it is re-weighed.

Holigarna, and its Blistering Principle. D. Hooper. (*Pharm. Journ.*, 3rd series, xxv. 1197.) There are seven known species of *Holigarna*, all of which are Indian. Their names and geographical distribution are given as follows:—

- H. arnottiana*, Western Peninsula.
- H. ferruginea*, W. Peninsula, Travancore.
- H. longifolia*, Chittagong, Pegu.
- H. helferi*, Tenasserim.
- H. grahamii*, Western Peninsula.
- H. beddomei*, Western Peninsula.
- H. albicans*, Pegu, Martaban.

The native names applied to these trees are charei, karun-charei, cattu-tsjern (*Malyalum*); kalu-geri, kuti-geri, hool-g ri (*Canarese*); bibu (*Mahratta*). The exudation from the stem of *H. ferruginea* and others has blistering properties, but this can only be obtained in the dry weather during March and April.

The author has obtained some specimens of the fruit of *H. ferruginea* for examination. The fruit is a drupe, ovoid or elliptic in shape, black-coloured, about seven-eighths of an inch long by half an inch in diameter. The pulpy pericarp becomes thin when dry, and is of a uniform black colour, but the pulp when fresh is greenish and mucilaginous. The testa is thin and dark-brown, and encloses a whitish starchy pair of plano-convex cotyledons, with dark-coloured veins running through them. The embryo is suspended from below the apex of the fruit, and the minute radicle is situated next to the hilum.

The chemical examination of the fruit shows that the aqueous extract of the pericarps contains mucilage and a small proportion of tannin, while the ether and alcohol extracts contain the active vesicating principle of the fruit, associated with a black, resinous, varnish-like substance. The vesicating principle, after separation from the resins, was found to be an oily substance having a most irritating and acrid taste, and agreeing in its properties and action with cardol. It is considered as either identical with or closely

allied to the latter. The process for its isolation is given in the paper.

The dry seeds have a peculiar odour of *Ceratonia* pods. They are found to contain gallic acid, 12.4 per cent. of tannic acid, 8.5 per cent. of fat, and 3.7 per cent. of mineral matter. The alcoholic solutions of both pericarp and seeds give a greenish colour with caustic alkalies similar to that obtained by Basiner with the oil from the pericarps of the marking nut, a reaction which Lyon relies upon as a test for detecting the presence of the marking nut in toxicological investigations.

The properties of the Holigarnas are thus found to be similar to those of two other trees of the same natural order, namely, the marking nut (*Semecarpus anacardium*) and the cashew nut tree (*Anacardium occidentale*), and in view of recent investigations by Pfaff on *Rhus toxicodendron* and *Rhus venenata*, it is not considered improbable that cardol is present in other vegetable products of the *Anacardiaceæ*.

Constituents of Persian Berries. A. G. Perkin and J. Geldard. (*Proc. Chem. Soc.*, No. 151.) These berries, the produce of *Rhamnus infectoria* and other species, are well known to contain a glucoside, xanthorhamnin, decomposable by acids into isodulate and a colouring matter, rhamnetin. With hydriodic acid rhamnetin yields methyl iodide and quercetin, the colouring matter of quercitron bark (Herzig, *Monatsch.*, ix. 548-561). It is consequently a quercetin monomethylether, $C_{16}H_{12}O_7$. According to earlier workers there is also present a second glucoside which gives a colouring matter more soluble in alcohol than rhamnetin, and therefore called β -rhamnetin. Herzig (*Monatsch.*, x. 561-567), when studying this subject, isolated from the berries a glucoside which he regarded as a loose double compound of xanthorhamnin and quercitrin, as by decomposition it yielded a mixture of rhamnetin and quercetin. Hence β -rhamnetin appeared to be quercetin.

In this paper it is shown that Persian berries contain a third substance readily isolated from the mixed colouring matters by extraction with toluene. It forms long yellow needles somewhat resembling anthraquinone, melting at 214° - 215° , corresponding to the formula $C_{17}H_{14}O_7$, and crystallizing from acetic acid with 2 mols. of acetic acid of crystallization. The name *rhamnazin* is suggested for this substance, which appears to be a *quercetin dimethyl ether*, and is nearly devoid of dyeing properties.

It is known that an aqueous extract of Persian berries ferments

at 30°–40°, depositing a yellow powder, the supernatant liquid being of an orange-brown colour. This powder is shown by the authors to be a mixture of rhamnetin and rhamnazin, with but a trace of quercetin. The supernatant liquid when boiled with acids gives a considerable quantity of quercetin only. It therefore appears that the ferment contained in the berries, while readily decomposing xanthorhamnin and the glucoside of rhamnazin at this temperature, exerts but little influence upon the glucoside of quercetin also present.

The colouring matters of Persian berries are rhamnazin, rhamnetin, and quercetin.

Note on Kamala. J. Barclay. (*Chemist and Druggist*, February 23rd, 1895, 274.) Attention is drawn to the great variability in the quality of this drug, and the difficulty of obtaining a sample answering the B.P. requirements respecting the proportion of ash. Six samples of the drug examined contained 6·1, 22·0, 67·7, 46·9, 9·23, and 69·2 per cent. of ash respectively. The adulteration appeared to consist chiefly of ferruginous clay.

Constituents of Ergot. C. C. Keller. (*Journ. de Pharm.* [5], xxx. 67–70.) The author has been unable to obtain more than one single alkaloid from ergot of rye, and this he finds to be identical in its properties with Tanret's ergotinine, Blumberg's picrosclerotine, and Kobert's cornutine. He proposes the retention of the name cornutine for what he considers to be the only alkaloid existing in this drug.

Spasmotin (Sphacelotoxin), a New Preparation of Ergot. (From *Pharm. Journ.*) This product was first introduced by Böhringer, who exhibited it at the International Medical Congress at Rome. It is a yellow, amorphous powder, insoluble in water, dilute acids, or petroleum ether, but soluble in alcohol or benzol, and very readily soluble in ether. Its activity was stated to be very great in doses of four to eight centigrams. In a recent report of Gehe and Co., reference is made to this product, and the opinion is expressed that apart from the various galenical preparations of ergot, the differences in the chemical products obtained from the drug by chemists are chiefly due to differences in the material operated upon, inasmuch as the varying influence of the conditions of the climate, growth, preservation, etc., affect the action of the fungus upon the albuminous constituents of the grain. The greater the degree of moisture of the ergotised grain, and the less carefully it is dried, the more powerful is this action. The fact that Keller found scarcely any ergotinine in ergot that was care-

fully collected and dried may be thus explicable, as well as the circumstances that some parcels contain only amorphous ergotinine, while others contain it in a crystallizable condition—some being quite inert, while others are highly poisonous. If the preparation of products from ergot is thus rendered uncertain, still further difficulties arise from their liability to alteration. Thus, for instance, the alcoholic solution of some kinds of ergotinine rapidly turns red, and after some time gives no alkaloid reaction. In the absence of any trustworthy chemical test of identity, physiological experiment is the only means available. Cornutine appears to be a product of the alteration of ergotinine. Sphacelinic acid, again, has only been obtained in the form of a dark-coloured resin, and as it is rendered immediately inert by contact with alkalies, all attempts at purification have been fruitless. In operating upon a large quantity of ergot, Gehe and Co. have obtained a product presenting the characters attributed to spasmotin, and behaving as an acid. They offer to provide medical men with a supply for the purpose of testing its physiological action.

Constituents of *Parmelia Parietina*. R. Kobert and W. Lilienthal. (*Zeitschr. des oesterr. Apoth. Ver.*, xlviii. 30–38.) This lichen yields to benzene a colouring matter which the authors consider to be the active principle, and for which they propose the name *chrysophyscin*. The names “parietin” and “chrysopykrin” have been previously suggested for this substance by Thomsen and Stein respectively. The authors regard it as a dihydroxyanthraquinone. It forms small, golden-yellow, needle-shaped crystals, soluble in alkalies, to which they impart a blood-red coloration. It does not contain chrysophanic acid, and is not identical with vulpinic acid.

Constituents of *Parmelia Parietina*. O. Hesse. (*Liebig's Annalen*, 1895, cclxxxiv. 157–191.) On extracting *Parmelia parietina* (*Physcia parietina*) with ether, a compound is obtained which the author proposes to call *physcion*, this name being selected in preference to *chrysophyscin* (preceding abstract), owing to its quinonic character and to the fact that the colour is brick-red instead of golden. It fuses at 207° C., is soluble in alcohol forming a neutral solution, and has a composition corresponding to the formula $C_{16}H_{12}O_5$. In addition to *physcion*, the lichen contains two other constituents which the author describes under the respective names of *physcianin*, $C_{10}H_{12}O_4$, and *physciol*, $C_7H_8O_3$.

Constituents of Lecanora Sulphurea. G. Paternò and F. Crosa. (*Gazz. Chim. Ital.*, xxiv. i. 297-305.) The ether extract of this lichen is found by the authors to contain a resin, usnic acid, rangiformic acid, and a new *substance* the composition of which corresponds to the formula $C_{27}H_{30}O_9, H_2O$. The latter may be purified by crystallization from alcohol, benzene, and carbon bisulphide, and is ultimately obtained in white, pearly laminae melting at 92° - 93° ; the anhydrous substance separates from benzene in minute crystals melting at 123° - 124° . On cooling the molten mass, it becomes vitreous and melts at about 65° ; if this is treated with dilute alcohol, it absorbs water with great development of heat, and yields the hydrate melting at 92° - 93° . It is readily soluble in cold caustic alkalies, giving solutions which resinify on exposure to air, whilst the alcoholic solution reduces silver nitrate and Fehling's solution, and gives a violet coloration with ferric chloride.

Bilberry Juice as a Remedy for Eczema. Prof. Winternitz. (*Zeitschr. des oesterr. Apoth. Ver.*, from *Corresp.-Bl. für Schweiz. Aerzte*, 1895, No. 7.) Bilberry juice has proved very efficient in the treatment of this affection. The fresh juice is evaporated to the consistence of a syrup, which is applied to the affected parts by means of a camel-hair brush, and the application is renewed at frequent intervals. The effect is stated to be most marked, obstinate cases having been cured in the course of a few days. The stains can be afterwards removed by washing with a warm 6 per cent. solution of common salt.

Kino. (*Pharm. Journ.*, 3rd series, xxv. 646.) In consequence of the scarcity of the ordinary kinos, other varieties are coming into the market, notably Bengal or Pulas kino (*Butea frondosa*), which is distinguished by having particles of bark always attached to it and by its ruby colour. African or Gambia kino (*Pterocarpus erinaceus*) has also been imported. It is smaller, brighter, and of a more purplish red than ordinary kino. This kind is the original kino, deriving its name from the African name of the tree "Kano," and its importation appears to date from about the year 1811. The tree grows from Senegambia to Angola, and the tincture of this kino has the reputation of not becoming gelatinous when kept.

Adulteration of Cutch. Gehe and Co. (*Pharm. Centralhalle*, April 25th, 1895.) It is stated in this paper that this drug is often adulterated in the countries where it is produced with

extracts of the bark or wood of *Terminalia Oliverii*, *T. tomentosa*, *T. bialata*, *T. chebula*, and other species of the same genus.

Aloin. C. A. Serre. (*Druggists' Circular*, from *Pharm. Journ.*, 3rd series, xxv. 839, 840.) Typical samples from American, English, and German makers of "aloin" were examined by the author with the following results:—

	A. American.	B. American.	C. English.	D. German.
Colour	Bright pale yellow.	Brown.	Greyish yellow.	Deep bright yellow.
Melting point . .	116°	140°	145°	142°
			Softens only.	
Resin	—	5·8 p.c.	—	—
Ash	—	1·4 p.c.	4·7 p.c.	1·3 p.c.

He states that a very good method of ascertaining if aloin is absolutely free from resin consists in adding 20 c.c. of water in a test-tube to one grain of the finely powdered sample, shaking and allowing to stand for one minute. The solution should be perfectly clear. With the exception of sample A, not one of the above stood the test. All samples not meeting with the requirement should be looked on as suspicious. The melting point, by which the solubility is affected, should also be insisted upon. The author considers that, until these points be properly taken into account, aloin will continue to be a very indefinite substance.

Gum of Acacia Decurrens. W. E. Stone. (*Amer. Chem. Journ.*, 1895, 196–199.) The author has examined this gum, and finds that it contains a complex carbohydrate of the galactoaraban character, and does not differ essentially from gum-arabic, peach gum, or cherry gum.

Galbanum. A. Conrady. (*Archiv der Pharm.*, ccxxxii. 130.) The author has further investigated the composition of this drug with the following results:—

Resin, soluble in alcohol	63·5 per cent.
Essential oil	9·5 " "
Gum and impurities	27·0 " "

The pure resin, obtained from the crude product by extraction with alcohol and subsequent treatment with sodium salicylate, contains 20 per cent. of combined umbelliferone, 50 of galbaresinotannol, and 0·25 of free umbelliferone. A solution of the pure resin in cold caustic potash shows a blue fluorescence, indicating the formation of umbelliferone; on heating the solution, umbellic

acid is formed. Since umbelliferone is unattacked by sulphuric acid, the hydrolysis of the resin is best effected by that reagent, about 20 per cent. of umbelliferone being obtained in this way; the other product of hydrolysis is *galbaresinotannol*, $C_{18}H_{30}O_3$, from which *barium*, *acetyl*, and *benzoyl* derivatives were obtained. Galbaresinotannol therefore contains an hydroxyl group, and the pure resin is most probably a galbaresinotannyl salt of umbelliferone. Distillation of the resin alcohol with phosphoric anhydride gives rise to a hydrocarbon of the formula $C_{15}H_{20}$, and oxidation with moderately diluted nitric acid leads to the formation of camphoric and camphoronic acids. The ethereal oil of commercial galbanum oil undergoes decomposition in a current of steam, with formation of isovaleric acid and a terpene, probably associated with a sesquiterpene.

The Asafœtida Plants. E. M. Holmes. (*Pharm. Journ.*, 3rd series, xxv. 131, 132.) The author shows that although an asafœtida may be produced by a number of species, the drug is only collected in certain localities, and not from all the species capable of yielding it. *Ferula Jæschkeana* is certainly not one of the asafœtida-yielding plants.

Grass Tree Gums. J. H. Maiden. (*Agric. Gaz. of N. S. Wales*, 1894, 757. From *Pharm. Journ.*) The author contributes some further information concerning the so-called "gums" or resins of the grass trees. The two principal kinds finding their way to Europe are the yellow, or "acaroides," and the dark-red, or "black boy" gum. The former was used in English trade at the end of the last century, but seems never to have been used in Australia, and its origin appears to be unknown. The black boy gum derives its name from the fact that the *Xanthorrhœas*, or grass trees, are called "black boys" in Australia, for the reason that a native boy with a tuft of grass on his head and holding a spear resembles in outline one of these plants when in flower, the inflorescence being erect, rigid, and rod-like.

The acaroides resin is derived from *Xanthorrhœa hastilis*. A tolerably clean specimen selected by the author yielded 94·6 per cent. of a yellow resin to alcohol, and the solution on evaporation deposited benzoic acid in feathery crystals. Petroleum spirit extracted 1 per cent. of a fragrant body, apparently containing no benzoic acid.

The black boy resin obtained from *Xanthorrhœa arborea* yielded 94·6 per cent. of a deep orange-brown resin to alcohol, and to petroleum spirit 3 per cent. of a yellowish resin, destitute of

odour. During evaporation of the alcoholic solution a few crystals of benzoic acid separated out. It is also soluble in eucalyptus oils, except that of *E. amygdalina*. Another species, *Xanthorrhœa tateana*, yields a ruby-red resin, which is of an orange-chrome colour when powdered, of which only 1 per cent. of an odourless resin is dissolved by petroleum spirit. The quantity of benzoic acid present in it is intermediate in quantity between that of *X. australis* and *X. hastilis*.

A description is given of the method of collecting the resin, for which reference should be made to the original paper.

Commercial Thapsia Resin. F. Canzoneri. (*Gazz. Chim. Ital.*, 1894, 437, 438.) Further examination has shown the presence of the following constituents in this resin: cholesterol, isocholesterol, thapsic acid, a terpene, a camphor, angelic acid, isovaleric acid, caproic acid, caprylic acid, euphorbion, a greenish aromatic oil, a small proportion of a substance which induces frothing and fuses at 87°, a resin containing sulphur, and waxy, gummy, and fatty matters.

Australian Sandarach. J. H. Maiden. (*Amer. Journ. Pharm.*, 1895, 214–220.) Several Australian species of *Callitris* produce a gum resin like sandarach, viz., *C. calcarata*, *C. columellaris*, *C. cupressiformis*, *C. macleayana*, *C. muelleri*, *C. parlatorei*, and *C. verrucosa*, the first and last named of which are the most important commercially. The resin of the former has the colour and appearance of the best selected sandarach, and it is soluble in rectified spirit, forming a slightly yellowish liquid, leaving only 1·3 per cent. of residue. Petroleum spirit extracts 22·1 per cent. of a colourless resin. The resin of *C. verrucosa* is yielded in tolerable abundance, 8–10 ounces being frequently found at the foot of a single tree. It dissolves almost wholly in rectified spirit, leaving only a little whitish deposit; petroleum spirit dissolves 22·8 per cent. of it. Although soluble in essential oils, it is not so in turpentine at ordinary temperatures, but it is readily soluble in ether.

Resin of Pinites Succinifer. E. Aweng. (*Archiv der Pharm.*, ccxxxii. 660.) The author has examined the resin formed in the stem and branches of the amber tree, and finds that nearly one-fourth of its weight is soluble in alcohol, whilst the remainder appears to resist the action of all ordinary solvents. The portion soluble in alcohol consists chiefly of free succino-abietic acid along with a small proportion of a compound of this acid with borneol. In the author's opinion the resin is of pathological as well as of physiological origin.

Balsam of Tolu. P. Oberlaender. (*Archiv der Pharm.*, ccxxxii. 559, 600.) The author considers balsam of tolu, like Peruvian balsam, to be a pathological product. The resinous portion of the balsam is found to consist of a resin alcohol (*toluresinotannol*), in combination with cinnamic acid, and to a slight extent also in combination with benzoic acid. Besides these constituents the balsam contains a small percentage of benzyl benzoate, associated with a little benzyl cinnamate and traces of vanillin. Styracin, free benzyl alcohol, and phenyl-propyl cinnamate appear to be absent. *Toluresinotannol*, $C_{17}H_{18}O_5$, a lower homologue of peruresinotannol, is a dark-brown, neutral, odourless, and tasteless powder, decomposing at $100^{\circ}C$. without melting, and proves by its reactions and properties to be closely related to the tannins. It is obtained from an ethereal extract of the balsam by first extracting the resinous salts with cold alkali and precipitating them with carbonic anhydride, and then repeatedly hydrolysing them with alkali, the resin alcohol being precipitated after each dissolution with hot hydrochloric acid. The final purification is effected by repeated precipitation with acid from ammoniacal solution.

Tests for the Purity of Balsam of Peru. Gehe and Co. (*Pharm. Centralhalle*, April 25th, 1895.) The author's experiments with a large number of samples show that in genuine balsams the proportion of cinnamein lies between 57 to 60 per cent., the saponification equivalent being from 235 to 238. If a balsam shows results differing from these figures, it can be pronounced as adulterated with certainty; if the saponification number is right, and the proportion of cinnamein too low, the sample is at least of inferior quality. The test is applied thus:—About 5 grams of the balsam are shaken with 5 grams of water and an equal quantity of official solution of soda. The cinnamein is then extracted by washing with three successive quantities of 10 grams of ether. The ether is evaporated on a water-bath, and the cinnamein weighed. As the ether takes some time to volatilise, it is necessary to take successive weighings, the final one being taken when the loss is not more than 1 centigram in five minutes. To the weighed residue 35 to 40 c.c. of semi-normal alcoholic potash solution are added, and about 20 c.c. of alcohol; this mixture is saponified on the water-bath, and the amount of uncombined alkali determined by means of semi-normal acid solution.

American Storax. K. Mohr. (*Pharm. Zeitung*, xl. 338.) This drug is collected in the State of Mississippi, and is the produce of

Liquidambar styraciflua. It is used as a chewing-gum, and also for catarrh.

Detection of Castor Oil as an Adulterant in Copaiba and Croton Oil. L. Maupy. (*Chem. Centr.*, i. 929.) The author's test is based on the formation of sebacic acid and caprylic alcohol on heating substances containing castor oil with solid sodium hydrate. Caprylic alcohol is readily recognised by the characteristic odour of the fumes given off in this process. When the fluid paste obtained on heating and stirring with the alkali is dissolved in boiling water, and the solution filtered while being kept hot, sebacic acid is precipitated from the filtrate on the addition of a mineral acid. The development of the odour of caprylic alcohol, however, is the leading feature of the test.

Detection of Gurjon Oil in Copaiba. T. D. Dodge and Olcott. (*American Druggist*, xxvii. 5.) On dissolving four drops of gurjon oil in half an ounce of glacial acetic acid, and then adding 4 to 6 drops of nitric acid, the mixture will assume a deep purple colour. Pure copaiba treated in the same way yields a colourless mixture; but copaiba adulterated with gurjon oil will show the purplish colour more or less according to the proportion of adulterant. In some instances it is found to be a distinct advantage to distil off the oil from the suspected sample, and to submit this (the volatile oil) to the test.

Balsam of Tamacoaré; a Brazilian Vegetable Oil. F. Pfaff. (*Archiv der Pharm.*, ccxxi. 522-541. From *Journ. Chem. Soc.*) Tamacoaré balsam is viscid, and of a yellowish-brown colour; it is heavier than water, with which it forms an emulsion, but is soluble in all other ordinary solvents. When distilled, either under atmospheric pressure or in a vacuum, it undergoes decomposition, and, although a clear oil passes over in a current of superheated steam, the distillate soon becomes brown as the temperature rises.

A study of the chemical properties of Tamacoaré balsam shows it to consist of an individual substance of the formula $C_{23}H_{34}O_6$. By mixing alcoholic solutions of the oil and mercuric chloride, a derivative of the composition $C_{23}H_{33}O_5$, $Hg\ Cl$ is obtained, crystallizing in tufts of colourless needles, soluble in cold chloroform and ether, but insoluble in boiling alcohol. On passing hydrogen sulphide through a solution of the compound in ether and alcohol, to which a few drops of hydrochloric acid have been added, mercuric sulphide is precipitated, whilst the filtrate contains the original oil. One specimen of Tamacoaré balsam, after remaining in a stoppered flask for two years, deposited colourless crystals identical in chemi-

cal properties with the oil, which is regenerated by dissolving the crystalline product in any ordinary solvent (alcohol excepted) and evaporating.

Decomposition of the oil with concentrated alkalies gives rise to numerous products, of which, however, normal butyric and caprylic acids only have been identified.

Oil of Henbane Seed. H. Schwanert. (*Archiv der Pharm.*, ccxxxii. 130-136.) This oil is found to be free from alkaloids, and to consist chiefly of olein, with a small proportion of palmitin, and traces of colouring matter. The iodine number, as determined by Gantter's process, is 64.48.

Fixed Oil of Carapa Guianensis. E. H. Gane. (*Pharm. Journ.*, 3rd series, xxv. 1150.) This oil is reputed to possess anthelmintic properties, and to be a powerful insecticide; it is used by the Warau Indian women for anointing the hair, and popularly known as "crab oil," a term which may refer to its insecticide properties, or possibly be a corruption of the word "carapa."

The author's chemical examination of the oil shows that its constituents are free fatty acid, glycerates of oleic, palmitic, and stearic acids, and a small amount of a bitter principle of an alkaloidal character. The latter is probably identical with the principle present in the bark of the tree. Experiments were also made to determine the physiological properties of the oil. Administered internally it possesses slight purgative properties, but the taste is too nauseous to admit of its employment as such. As an insecticide it appears to be of considerable value. Insects will quickly steer clear of it, if it be daubed on trees frequented by them, and when made into a soap, and the soap dissolved in water, and the solution used as a spray, it forms an efficient insecticide for greenhouse or outdoor plants.

Mace Oil. E. Spaeth. (*Forschung's Berichte*, ii. 148.) The fat extracted by petroleum spirit from Bombay mace, the produce of *Myristica malabarica*, is found to differ considerably from that obtained from other kinds of this drug, as may be seen from the following numbers:—

	Bombay Mace.	Banda Mace.
Melting point	31° C.	25° C. to 26° C.
Iodine number	51.3 to 53.5	78.0 to 80.4.
Zeiss' refractometer-degrees . . .	about 48.5	76° to 82°.
Saponification number	189.4 to 191.4	170 to 173.

Bombay mace may be identified by the above characteristic features of its fatty constituent, and further differs from genuine mace by its yielding a much smaller proportion of volatile oil, and by its microscopical characters.

Sophisticated Oil of Theobroma. R. Pfister. (*Forschung's Berichte*, i. 543.) The author refers to the adulteration of cacao butter with paraffin, and points out that such a sophistication may be readily detected by the usual saponification methods.

Fictitious Beeswax. L. F. Kebler. (*Amer. Journ. Pharm.*, 1895, 141, 142.) The author reports upon five samples of grossly sophisticated beeswax, four of which were composed of resin, chrome yellow, yellow ochre, hæmatite, mineral wax, and a small proportion of real beeswax. A fifth sample was composed of about equal parts of mineral wax and beeswax. The following table contains the analytical data of the adulterated samples. Number 1 is a beeswax of known purity for comparison:—

Serial Number.	M. P. C°.	Sp. Gr. at 15° C.	Acid Number.	Ether Number.	Total.	Ratio.	Adulterants.
1 . .	63·8	0·964	19·60	75·60	95·20	3·857	—
2 . .	48·0	0·925	25·13	48·30	73·43	1·122	{ Resin, paraffin, chrome yellow.
3 . .	52·0	0·910	4·20	12·60	16·80	3·000	{ Yel. ochre, earthy matter, paraffin.
4 . .	55·0	0·925	4·61	16·10	20·71	3·492	{ Earthy matter, paraffin, hæmatite.
5 . .	66·0	0·935	11·20	37·61	48·81	3·358	Mineral wax.
6 . .	74·0	0·921	10·50	19·60	30·10	1·866	Mineral wax.

Adulteration of Beeswax. A. Kremel. (*Pharm. Post*, xxvii. 465.) The author points out that a mixture of Japan wax, stearic acid, and ceresin in certain proportions resembles beeswax in its appearance, melting point, saponification number, and other characters, and differs from it only in having a lower specific gravity. He therefore regards the determination of the specific gravity as an essential step in the testing of suspected samples of wax, and also suggests that qualitative tests for the above-named substances should not be omitted.

Beeswax and its Impurities. B. S. Proctor. (*Pharm. Journ.*, 3rd series, xxv. 692.) The author suggests an exceedingly simple and handy test for the purity of beeswax, which may often save the trouble of a more elaborate examination. It simply consists in an expeditious mode of determining the specific gravity, carried out as follows:—The sample of wax, white or yellow, should sink,

if thrown into B.P. solution of ammonia of 0.959 specific gravity. When first immersed, it is liable to have air bubbles attached, which bring it to the surface; but if rubbed with the solution and immersed again, it will, if pure, go to the bottom. The test, though not a definite proof of purity, affords fair evidence that there is no large admixture of paraffin wax, the most probable adulterant.

Formation of Resinous Bodies and Essential Oils in Plants.

A. Tschirch. (*Ann. Agron.*, xx. 299, 300; *Jahrb. Wiss. Bot.*, xxv. 370; *Bot. Cent.*, lvii. 18. From *Journ. Chem. Soc.*) The following products were examined: Sumatra and Siam benzoin, Peru balsam, Tolu balsam, styrax, and galbanum. When hydrolysed, they yield, on the one hand, aromatic (chiefly benzoic and cinnamic) acids, or alcohols, and a group of "resin alcohols," or "resinols," on the other. *Benzoresinol*, $C_{16}H_{26}O_2$; *resinotannol*, $C_{18}H_{20}O_4$; *siaresinotannol*, $C_{12}H_{14}O_3$; *peruresinotannol*, $C_{18}H_{20}O_5$; *storesinol*, $C_{12}H_{19}O$; and *gulbaresinotannol*, $C_6H_{10}O$, were obtained. The termination "tannol" signifies that the alcohols give the tannin reaction. Resin alcohols yield with aromatic acids, or with other alcohols, ethers which seem to be identical with the natural ethereal salts of resins.

Resins frequently contain free acids and alcohols, as well as ethers. The fact that the highly carbonaceous resins and essences are formed at the earliest period of the life of the plant, when all disposable matter is utilized in the building up of new tissues, would seem to indicate that these compounds have an important biological rôle.

Aspen Tar. W. Adolphi. (*Archiv der Pharm.*, ccxxxii. 321-328.) Aspen tar, from *Populus tremula*, is much in use in Central Russia. It is a black, oily liquid, of sp. gr. 1.0586 at 15°, and has a peculiar and unpleasant odour; the crystalline laminae, which are visible in the body of the liquid, do not give the reactions of pimelic acid. The tar is completely soluble in absolute alcohol, acetone, or alkalies, and 72 per cent. of it distils below 300°, leaving a little pitchy residue. The distillate contains acetic, propionic, butyric, valeric, and caproic acids. The phenols present form 16.7 per cent. of the tar distilled, and boil at 200°-290°, more than half distilling at 250°-270°; the fraction boiling at 230° gives the catechol reaction, whilst the portions boiling at higher temperatures give the pyrogallol reaction with ferric chloride; guaiacol is also present. The hydrocarbons boil at 100°-340°; the major

part distilling at 210° – 260° ; paraffin melting at 38° was isolated from the fraction boiling at 290° – 340° .

Pine Tar. A. Renard. (*Comptes Rendus*, cxix. 165, 166, and 652–654.) Pine tar contains a terebenthene, which, after purification, boils at 171° – 174° C.; it has a specific gravity of 0.866 at 0° C.; and a rotatory power of $[\alpha]_D = 19.1^{\circ}$, and absorbs oxygen much more readily than ordinary terebenthene. It also contains a new hydrocarbon, $C_{14}H_{22}$, which, after purification, is a colourless, optically inactive liquid, turning rapidly brown on exposure to air. It boils at 254° – 257° C., and has a specific gravity of 0.9419 at 0° , and the refractive index 1.507. In addition to these, the tar contains hydrocarbons boiling above 300° , phenols, a resin rich in retene, and a small percentage of water. The sample of tar examined by the author had a specific gravity of 1.054.

Volatile Oil of Abies Balsamea. C. G. Hunkel. (*Amer. Journ. Pharm.*, 1895, 9–13.) The author has re-examined the oil distilled from the fresh leaves and a few cones of *Abies balsamea*. It was found to have a specific gravity of 0.8892 at 20° C., and a rotatory power of $[\alpha]_D = -32^{\circ}.66$ in a 100 mm. tube. In addition to the constituents already known, the author has ascertained the presence in the oil of *lævogyrate* pinene and *lævogyrate* bornyl acetate. The investigation will be continued.

Oil of Sassafras. L. F. Kebler. (*Amer. Journ. Pharm.*, 1895, 28.) The author has examined ten commercial samples of this oil. Four of these complied fairly with the requirements of the U.S.P., while one consisted of commercial safrol and the remaining five of the so-called pseudo sassafras oil or “artificial sassafras oil” produced by fractionating camphor oil.

Oil of Cananga. A. Reyhler. (*Bull. de la Soc. Chim.*, 1895, No. 3.) The author calls attention to the close agreement in the characters of this oil and that of *ylang-ylang*, and thinks it possible that the two essences may be obtained from the same vegetable source.

Oil of Pennyroyal. T. am Ende. (*Chem. Centr.*, i. 743.) The main constituent of the essential oil of pennyroyal is pulegone, a ketone of the composition $C_{10}H_{16}O$. When perfectly pure, pulegone boils at 220° – 225° C., and has a specific gravity of 0.933 at 20° , and the refractive index $n_D = 1.47974$ at 21° . A number of its derivatives are described.

Composition of American Oil of Peppermint. F. B. Power and C. Kleber. (*Zeitschr. für analyt. Chem.*, 1894, xxxiii. 762, 763.) The oil prepared by the authors from the fresh plant contains

acetaldehyde, valeraldehyde, acetic acid, isovaleric acid, pinene, phellandrene, l  volimonene, cineole, menthone, menthol, menthylic acetate, menthylic isovalerate, the menthylic salt of an acid $C_8H_{12}O_2$, a lactone, and cadinene.

To estimate the menthol and menthone, 20 grams of the oil are freed from the ethereal salts by heating with 30 c.c. of normal alcoholic soda for an hour in a flask with a reflux condenser, after which the unconsumed soda is titrated by normal acid (using phenolphthale  n). The well-washed oil is then acetylated by boiling for an hour with an equal volume of acetic anhydride and 2 grams of anhydrous sodium acetate in a reflux apparatus. The product is washed with water and dilute soda, dried with calcium chloride, and filtered. Using 8-10 grams, the saponification number of this acetylated product is then determined, and the menthol calculated therefrom. Since 1 c.c. of normal soda corresponds with 0.156 gram of menthol, or 0.198 gram of menthylic acetate, for every 1 c.c. of soda consumed, the difference, 0.042 gram, must be subtracted from the weight of acetylated substance employed, in order to calculate the percentage of menthol in the unacetylated oil.

For estimating the menthone, a portion of the oil freed from ethereal salts is dissolved in twice its volume of alcohol and boiled with sodium. The oil is then precipitated by water; one half of it is used for a menthol estimation, and the menthone is calculated from the excess of menthol found. The other half is again treated with sodium to ascertain whether the reduction of the menthone had been complete.

The sp. gr. of the oil ranges from 0.905 to 0.916; the specific rotatory power from -25° to -35° . The menthol present as ethereal salts varies from 3.45 to 14.12 per cent.; the free menthol from 24.2 to 72.7 per cent.; normal American oil containing 40-50 per cent. Mitcham oil, and especially Japanese oil, are richer in menthol than American. In a specimen containing 54.5 per cent. of menthol (total), 12.3 per cent. of menthone was found.

Eucalyptus Oil. E. M. Holmes. (From a paper read before the Pharm. Society, December 12th, 1894.) The author points out that the reputation of this oil as a therapeutic agent rests upon an unsatisfactory basis. On the one hand, eucalyptol is claimed to be the active ingredient, whilst on the other, phellandrene is the constituent in the oil on which its reputation is partly based. Nor is it known at present how far the antiseptic action

is due to ozone, to eucalyptol, to phellandrene, or to some of the aldehydes present in the oil. The author directs attention to the statement that eucalyptol can now, by virtue of Faulding's new patent process, be prepared in a perfectly pure state by the decomposition of its phosphoric compound in contact with water, and that it is therefore quite possible for pharmacologists to determine its real value or otherwise by actual experiment. He thinks that should eucalyptol be proved to be the most important constituent in the oil, it would be advisable to adopt it in the Pharmacopœia, in the place of an oil uncertain in its percentage of eucalyptol and variable also in other respects. Should eucalyptol, however, not prove the most valuable constituent, it would be necessary to direct attention to the other known constituents of the eucalyptus oils that have been offered in commerce. Meanwhile, as the properties of the other ingredients are unknown and may yet be of value, he points out that an oil has been placed in commerce, derived from *Eucalyptus odorata*, and standardised to contain 50 per cent. of eucalyptol, and that this is intended to serve as a perfectly pure oil, containing all the normal constituents in the average proportion, for use in cases in which such an oil may seem preferable to eucalyptol.

The author also gives an account of the manner in which the distillation of the oils is conducted in Australia, and discusses the nature and variation of the individual constituents occurring in different kinds, together with the question whether some of these bodies are actually existing in the leaves of the plant, or whether they are formed under the influence of heat, by the aid of the natural acids present in the leaf.

Eucalyptus Oil. H. Helbing and F. W. Passmore. (*Chemist and Druggist*, April 27th, 1895.) The authors consider that in judging and buying eucalyptus oil the following points should be taken into consideration:—

1. A proportion of 40 per cent. of crystallizable eucalyptol is required by the freezing process.

2. A proportion of 50 per cent. of eucalyptol is required by the phosphoric acid test.

3. A proportion of 40 per cent. of crystallizable eucalyptol obtained by the freezing process is equivalent to between 50 and 60 per cent. of crystallizable eucalyptol obtained by the phosphoric acid test.

For carrying out the phosphoric acid test, special attention is directed to the following requirements:—

1. Cooling and stirring the oil whilst adding a highly concentrated phosphoric acid, drop by drop, till a dark reddish coloration appears.

2. Pressing the eucalyptol phosphate between filter paper till the crystals are quite white.

3. Decomposing the eucalyptol phosphate with warm water, separating the eucalyptol, and determining that it solidifies easily by -3°C .

4. Testing as usual for irritant aldehydic compounds and phellandrene.

The Volatile Oil of Bay. F. B. Power and C. Kleber. (*Pharm. Rundschau*, xiii. 60.) The specific gravity of this oil is found to vary from 0.965 to 0.985. The authors' examination shows it to contain *myrcene*—a new terpene, in addition to eugenol, methyl-eugenol, chavicol, methyl-chavicol, phellandrene, and citral. Pinene is entirely absent.

Oils of Spike and Lavender. G. Massol. (*Journ. de Pharm.*, 1895, 49, 50.) The author has determined the rotatory power and the density of samples of these oils of known origin and purity, and has obtained results differing materially from those of previous investigators, which also exhibit considerable discrepancies among themselves. He arrives at the conclusion that the rotatory power and specific gravity of these oils are dependent on the character of the season, soil, etc., and cannot be used as tests of purity.

Oil of Cassia. J. Bertram and R. Kürsten. (*Journ. prakt. Chem.*, 1895, 316–325.) The authors have isolated from this oil a new crystallizable constituent which proves to consist of *orthocoumaraldehyde methyl ether*, which forms large, faintly yellowish crystals fusing at 45° – 46°C ., boiling at 160° – 161° , and decomposing very readily when exposed to light and air. Details will be found in the paper.

Essential Oils in their Relation to the British Pharmacopœia and Trade. J. C. Umney. (*Pharm. Journ.*, 3rd series, xxv. 946–952, 977–981, and 1039–1046; also *Chemist and Druggist*, May 4th, 1895, 620–622.) The author is of opinion that the pharmacopœial description, characters, and tests of essential oils should embody in every instance—

1. The source of the oil, defining, if possible, the precise species to be used, should more than one species be capable of employment.

2. The range of specific gravity at 15°C ., or at such other tem-

perature as may be convenient in the case of oils solid or partially so at that temperature.

3. More extended physical tests where such are capable of indicating purity or otherwise, such as optical rotation, solubility in alcohol of various strengths or other solvents, boiling point; and also chemical tests (qualitative and quantitative).

The following notes are brief summaries of the author's statements respecting the chief requirements with regard to the officinal and some non-officinal essential oils:—

Anise oil.—The official description should embody the following points:—Source: *Pimpinella anisum*; *Illicium anisatum*. Specific gravity: .975 to .990 at 15° C. Melting point: After solidifying should not melt below 59° F. (15° C.). Distinguishing test: The anise-fruit oil affords with saturated solution of hydrochloric acid gas in absolute alcohol a blue coloration, which is not yielded by star-anise oil.

Bay oil.—This oil as now usually met with in commerce consists of a mixture of the heavy and light oils distilled from the leaves of *Myrcia (Pimenta) acris*. The characters and tests of the U.S. Pharmacopœia are recommended for adoption.

Bergamot oil.—Specific gravity at 15° C.: .882 to .886. Solubility: In twice its volume of alcohol of 80 per cent. strength by volume. Rotation: Not more than +15 in 100 mm. tube. Residue: Not more than 6 per cent. when evaporated in a water-bath. Percentage of linalyl acetate: Not less than 38 per cent.

Cajeput oil.—Specific gravity: .922 to .927 at 15° C. Presence of a large proportion of cineol should cause it to become semi-solid on addition of syrupy phosphoric acid, 1:750.

Caraway oil.—Specific gravity not less than .910 at 15° C. Not more than 15 per cent. of the oil should distil below 185° C., and at least 55 per cent. should distil above 200° C.

Cassia oil.—Specific gravity at 15° C.: 1.050–1.065. Cinnamic aldehyde: Should not yield more than 25 per cent. of non-aldehydes when treated with acid sulphite of sodium, equivalent to 75 per cent. of cinnamic aldehyde.

Chamomile oil.—Specific gravity: .905–.912 at 15° C. Optical rotation: +1 to +3.

Cinnamon oil.—Specific gravity: At 15° C. 1.024–1.030. Optically inactive. One drop of the oil in 5 drops of rectified spirit should not give more than a pale green coloration with ferric chloride. The oil should not solidify with a solution of caustic potash. When treated with solution of bisulphite of soda, it should not

yield more than 45 per cent. of non-aldehydes, and thus show the presence of not less than 55 per cent. of cinnamic aldehyde.

Citronella oil.—This oil should possess a specific gravity of not less than .887, and be soluble in 10 parts of alcohol of 80 per cent. strength.

Clove oil.—Specific gravity: Not below 1.050 at 15° C. Optical rotation: Not more than -1.0 in 100 mm. tube. On saponification with 10 per cent. potash solution, not more than 15 per cent. should remain uncombined, showing 85 per cent. of eugenol. No portion of the oil should distil below 247° C.

Cubeb oil.—Specific gravity: .9222 at 15° C. Rotation: 3.30 in a tube of 100 mm.

Copaiba oil.—This oil should be lævo-rotatory, have a special gravity of .900-.910 at 15° C., and be soluble in its own volume of absolute alcohol.

Coriander oil.—Specific gravity: .870-.885 at 15° C. Solubility: In three times its volume of alcohol of 70 per cent. Rotation: +6 to +14. Not less than 45 per cent. should distil between 190° and 200° C.

Dill oil.—The oil distilled from English or German fruits. Specific gravity: .915-.925 at 15° C. Not more than 15 per cent. should distil below 185° C., and not less than 40 per cent. above 220° C. Dextro-rotatory to the extent of not less than +70.0 in a 100 mm. tube.

Eucalyptus oil.—No definite statement as to the proper characters and tests can be made until the relative therapeutic value of its constituents are better understood than is the case at present.

Juniper oil.—Specific gravity: .865-.890 at 15° C. Optical rotation: Not exceeding -10° in 100 mm. tube. Solubility in alcohol: Should be soluble in four times its volume of a mixture of equal parts of rectified spirit and absolute alcohol.

Lavender oil.—The author suggests that in the case of this oil (as well as that of peppermint) the requirement, "Distilled in Britain," be adhered to, the following characters and tests being added:—Specific gravity from .885-.900 at 15° C. Optical rotation: -6 to -10. Dissolves in three volumes of alcohol of 70 per cent. (by volume).

Mustard oil.—The German Pharmacopœia requires that the first and last fractions of the oil on distillation shall correspond with the specific gravity of the original oil, which test for the presence of alcohol, petroleum, etc., has been adopted by the United States Pharmacopœia. This test and the others contained in that work

are recommended by the author for adoption in a new British Pharmacopœia.

Lemon oil.—The author's experiments confirm the accuracy of the tests of the U.S.P. for the purity of this oil, and he therefore suggests their adoption in the New British Pharmacopœia, with the possible addition of the requirement that not more than 30 per cent. should distil under 172° C.; the rotation of such fraction not to vary more than 2° from that either of the original oil or its higher fractions.

Nutmeg oil.—The author proposes that the words "Distilled in Britain" be omitted, and the following characters and tests included:—Specific gravity: $\cdot 870$ – $\cdot 910$ at 15° C. Optical rotation from $+15$ to $+25$ in a tube of 100 mm. Soluble in an equal volume of a mixture of equal parts of rectified spirit and absolute alcohol. Absence of fixed oil: The oil should not leave a crystalline residue when evaporated on a water-bath.

Orange oil.—The following are suggested as the most desirable requirements for *ol. aurantii amar.*, obtained by expression from the fresh peel of *Citrus vulgaris*:—Specific gravity: $\cdot 848$ – $\cdot 856$ at 15° C. Rotation: Not less than $+92$ in a tube of 100 mm.

Peppermint oil.—Specific gravity at 15° C.: $\cdot 900$ – $\cdot 910$. Optical rotation: -25 to -32 in a tube of 100 mm. Not less than 50 per cent. should distil between 210° – 220° C.

Pimento oil.—Specific gravity: Not below $1\cdot 040$ at 15° C. Optical rotation: Not more than -4 . When treated with solution of caustic potash (as mentioned in connection with clove oil), not more than 25 per cent. should remain uncombined, equal to about 75 per cent. eugenol. Not more than 40 per cent. should distil below 247° C.

Pinus sylvestris oil.—Commercial samples of this oil vary considerably in specific gravity, optical rotation, and composition. The author considers it imperative, therefore, that if this oil be retained in a new B.P., its characters shall be so strictly defined as to necessitate an oil of constant composition being employed in pharmacy, of which the medicinal value, if any, may be determined. An investigation of the relative values of the oils of *Pinus pumilio* and *Pinus sylvestris* would be interesting, and would probably result in the inclusion of the former oil only in a new British Pharmacopœia. The samples of *Pinus pumilio* examined by the author proved fairly constant in characters.

Rose oil.—The following two characters appear to be those of the purest oils of Turkish distillation met with in trade:—

Specific gravity at 20°: .860-.870. Melting point: From 19° to 22° C.

Rosemary oil.—Specific gravity: .900-.920 at 15° C. Should be soluble in twice its volume of rectified spirit. Not more than 25 per cent. should boil below 170° C., and not less than 15 per cent. above 200° C.

Rue oil.—Specific gravity: -0.835 to -0.840 at 15° C. Rotation: Should be slightly dextro-rotatory. Not more than 5 per cent. should boil below 200° C. The oil should solidify on cooling to a temperature of about 4° C., and should afford a crystalline compound with a saturated hot solution of bisulphite of sodium.

Santal oil.—Specific gravity: Not below .975 at 15° C. Optical rotation: Not less than -16, and not more than -20. The greater portion distils between 275° C. and 295° C. One part of the oil should dissolve in 6 parts of alcohol of 70 per cent. by volume at 20° C.

Savin oil.—Specific gravity: .910-.930 at 15° C. Optical rotation: +40 to +50 in a tube of 100 mm. Not more than 25 per cent. should boil below 200° C.

Spearmint oil.—Obtained from either *Mentha viridis* or *M. crispa*. Specific gravity at 15° C.: .920-.940. Optical rotation in a tube of 100 mm.: -35 to -50. Not less than 35 per cent. should boil between 222° and 226° C. One part should dissolve in 1 part of alcohol of 90 per cent. strength, becoming turbid on further dilution.

Thyme oil.—Specific gravity: Not below .905 at 15° C. Rotation: Not more than -6. At least 25 per cent. should boil above 220° C.

Winter-green oil.—The natural oil of winter-green from *Gaultheria procumbens*, the oil of sweet birch (*Betula alba*), and the artificial or synthetic oil of winter-green (pure methyl salicylate) all have a specific gravity of 1.180 to 1.185, and boil between 217° and 222° C. On saponification and subsequent treatment with hydrochloric acid and recrystallization of the product, they all yield salicylic acid of the same melting point: 156.752°. The author therefore considers that, if one of these oils is to be included in the new B.P., there appears to be no valid objection to the introduction of the "synthetic" oil, provided that compliance with the above-detailed characters be required.

In addition to the foregoing conclusions, the author's report contains numerous interesting data which cannot be adequately dealt with in the form of a summary; the original should therefore be consulted.

Guaiacol and Peruvian Balsam in the Treatment of Tuberculosis. F. Schmey. (*Therap. Monatshefte*, 1895, 245.) The combined administration of these two remedies in the proportion of 0.3 of Peruvian balsam to 0.2 of guaiacol enclosed in gelatin capsules, is stated to have given the most successful results in the treatment of tuberculosis. Its efficiency is still further assisted by inhalations of a mixture of 10 parts of Peruvian balsam, 30 parts of rectified spirit, and 200 parts of distilled water. The favourable effect of Peruvian balsam is attributed to the cinnamic acid contained in it.

Saligenin as a Therapeutic Agent. L. Lederer. (*Med. Wochenschr.*, xli. 619.) The physiological action of salicin is generally attributed to the saligenin formed from it as a product of hydrolysis during its passage through the organism. The author is therefore inclined to think that saligenin might advantageously take the place of salicin as a therapeutic agent, and that it may be likely to prove stronger and more direct in its action. Its exact physiological characters, however, have not yet been determined by actual experiments.

Cadmium Salicylate as a Therapeutic Agent. P. Cæsar. (*L'Orosi*, xvii. 262-265. From *Pharmaceutische Centralhalle*.) This salt possesses valuable antiseptic properties, and is recommended by the author in the treatment of suppurating inflammation of the eyes. It is obtained by the action of salicylic acid on cadmium oxide or carbonate, and forms shining crystals melting at 300° C., which are sparingly soluble in water, but more soluble in alcohol, ether, or glycerin.

Strontium Salicylate as an Intestinal Antiseptic. H. C. Wood. (*Chemist and Druggist*, February 23rd, 1895.) The author states that this salt, in doses of 5 grains, is one of the best intestinal antiseptics, yielding better results than salol, naphthalin, and similar agents. In doses of 10 to 15 grains it is found to have the specific action of a salicylate in gouty and chronic rheumatic conditions without producing disturbance of the stomach. In chronic gouty conditions and uric acid diathesis with intestinal indigestion it appears to be particularly valuable.

The Therapeutic Value of Piperazine. M. Biesenthal. (*Virchow's Archiv*, cxxxvii. 51-77.) The author reports most favourably on the powerful solvent action of piperazine on uric acid deposits and calculi, and on its value as a remedy for gout and uric acid diathesis.

Piperazine as a Solvent of Uric Acid Deposits and Calculi. J. Fawcett. (*Brit. Med. Journ.*, 1894, 1426.) The author's results

seem to throw considerable doubt on the therapeutic value of piperazine as a solvent of gravel and stones consisting of uric acid. He finds that though an aqueous solution of this remedy readily dissolves uric acid calculi, a solution of it in urine of the strength of 1 gram per litre, which is above the proportion usually occurring in the urine after the internal administration of piperazine, exercises no solvent action whatever.

Propylamine in Chorea. F. A. Weiss. (*Chemist and Druggist*, February 9th, 1895.) Propylamine is proposed by the author for the treatment of chorea, in which he has found it beneficial in doses of $\frac{1}{2}$ a drachm to 2 drachms or more per day. It is best combined with peppermint to cover the taste.

Physiological Action of Pyridine. T. L. Brunton and F. W. Tunnicliffe. (*Journ. Physiol.*, xvii. 272-276.) Experiments on animals lead to the conclusions that pyridine, in comparison with its derivatives, is not an active poison, and that its action is chiefly confined to the sensory part of the nervous system. In small doses it has a stimulating, and in large doses a direct paralysing action on the cardiac muscle.

Physiological Action of some Pyridine, Naphthalene, and Quinoline Derivatives. R. Cohn. (*Zeitschr. für physiol. Chem.*, xx. 210-218.) Quinaldine administered to rabbits is entirely destroyed in the organism, and the same appeared to be the case in experiments on dogs. Monomethylquinoline is entirely destroyed in the body of dogs. Trimethylquinoline is changed into the corresponding quinoline-tri-carboxylic acid to a slight extent; the rest is destroyed.

Physiological Action of Nicotine. M. Parenty and J. Grasset. (*Comptes Rendus*, cxix. 1273; *Pharm. Journ.*, 3rd series, xxv. 641.) The authors show that whilst the fatal dose of pure nicotine is from 20 to 21 milligrams per kilogram of animal, that of combined nicotine in its ordinary salts is 70 milligrams, whilst that of the quadroxalate may be as much as 150 milligrams per kilo. The physiological effects of the latter are, in a minor degree, the same as those of pure nicotine—contraction of the pupils, paralysis and convulsions, salivation, etc.—but it was proved by experiments that animals could become accustomed to take larger quantities daily than the normal fatal dose.

Physiological Action of Melanthin. W. v. Schulz. (*Pharm. Zeitschr. für Russland*, xxxiii. 51.) Melanthin, which was isolated by Greenish from the seeds of *Nigella sativa*, has been studied by the author with regard to its physiological action. It is shown to

produce effects identical with the action of the most toxic saponins; and this observation confirms the view of its nature previously arrived at by the author as well as by R. Kobert.

Physiological Action of Hydrazine. P. Borissow. (*Zeitschr. für physiol. Chem.*, xix. 499.) Curtius showed that hydrazine unites firmly with aldehyde groups. Hence it is important to investigate its action on the organism. Loew has shown that it rapidly kills seedlings, fungi, and infusoria. In the present experiments, it was subcutaneously injected into dogs. In small doses (0.05 gram of the hydrazine sulphate per kilo. of body weight) it produced slight stimulation; in large doses (0.1 gram per kilo.) the stage of stimulation was more intense, and followed by depression, ending in coma and death in two days. Given by the mouth, it produced salivation and sickness. The heart went more quickly at first, then slowed gradually and became irregular. The respiratory movements resemble those of asthma. The temperature of the body sinks.

The urine was strongly acid, and contained small quantities of the unchanged hydrazine, a small amount of albumin, in one case bile pigment, and in most cases considerable quantities of allantoin. The saliva, which is abundant, also contained allantoin.

At the autopsy, hyperæmia of the intestine, liver, and kidneys was observed.

Physiological Action of the Compounds of the Cocaine Series. P. Ehrlich and A. Einhorn. (*Ber. der deutsch. chem. Ges.*, xxvii. 1870-1873. From *Journ. Chem. Soc.*) Cocaine, in addition to its action as an anæsthetic, produces a very marked change in the liver, which is characterised by a great increase in the volume of that organ and a specific degeneration of the liver cells (Ehrlich, *Deut. Med. Woch.*, 1890, No. 32). This property is not possessed by ecgonine, its ethers or benzoylecgonine, whereas the ethers of benzoylecgonine (Falck, *Inaugural Diss.*, Kiel, 1886) and the ethers of derivatives of ecgonine containing other acid radicles, such as isatropyl, cinnamyl, phthalyl, phenylacetyl, etc., act on the liver in the same way as cocaine itself. Of all these compounds, only the phenylacetic derivative is an anæsthetic, and the same relations hold for the *d*-cocaines.

Orthochloro- and metanitro-derivatives of both *l*- and *d*-cocaine have but little anæsthetic action, but produce the characteristic effect on the liver, whilst the metamido-compounds are devoid of both these properties. The metahydroxy-derivatives occupy an intermediate position, having a very slight anæsthetic action, and

only producing the characteristic action on the liver in large doses. When the acetyl or benzoyl group is introduced into the amido group of the amido-cocainés, the substances obtained act on the liver but are not anæsthetics, whilst the cocaine-urethanes are much more powerful anæsthetics than cocaine itself, and also have the characteristic action on the liver. On the other hand, meta-benzenesulphamido-*d*-cocaine and *d*-cocainecarbamide have no anæsthetic effect, so that this property does not simply depend on the neutralisation of the basic amido-group by an acid radicle. The colouring matters derived from *d*-cocaine have also been examined; *d*-cocaineazodimethylaniline hydrochloride only produces extremely slight anæsthesia, whereas *d*-cocaineazo-*a*-naphthylamine hydrochloride is an anæsthetic, but does not act on the liver. The norcocainés have a more powerful anæsthetic action than the cocainés themselves, and also act on the liver, but they are much more violent poisons.

The compounds of cocaine with methylic iodide possess none of the characteristic physiological properties of the cocainés.

The power of producing anæsthesia is by no means confined to the alkaloids of the cocaine series, since it is common to many benzoyl and other derivatives of alkaloids, which will form the subject of further communications.

Physiological Action of Chlorocaffeine and Cyanocaffeine. J. W. Pickering. (*Journ. Physiol.*, 1895, 395-401. From *Journ. Chem. Soc.*) The introduction of an atom of chlorine into the caffeine molecule considerably modifies its physiological action, as tested on the hearts of embryo chicks, frogs, and human beings. It appears that a chemical stimulus or depressant may exert its action, due to one or more molecular groups in its substance; and that one group of atoms may modify the physiological action of other groups of atoms in the same molecule. This apparently occurs in the case of chlorocaffeine, the three methyl groups would tend to induce tonic contraction of the heart muscle, and the chlorine atom to produce an atonic condition. Chlorocaffeine (chlorotrimethylxanthine) produces far less tonic contraction of the heart than caffeine itself. Thus here is a case of physiological antagonism going on in the interaction of the parts of one molecule and living contractile tissue.

In the introduction of cyanogen into the caffeine molecule, the cyanogen overpowers the physiological action of the three methyl groups, and the cyanocaffeine acts more like a cyanogen derivative than a xanthine derivative, being almost immediately fatal to the

heart of chick and frog; there is no evidence of tonic contraction at all, and the heart ceases to act while in extreme diastole.

The possibility of the living tissue decomposing the chlorocaffeine and cyanocaffeine into free chlorine, cyanogen, and caffeine respectively was not overlooked, but tests failed to give evidence of these substances.

A solution of caffeine in chlorine water acts differently, the free chlorine being very toxic to the heart. Chlorocaffeine is a powerful diuretic and apparently also a cerebral stimulant.

Therapeutic Value of Digitalis Constituents. G. Bardet. (*Journ. de Pharm.* [6], i. 27.) The author regards crystallized digitalin as the only digitalis product possessing a definite, constant, and well-investigated therapeutic action. Digitoxin is considered by him as an indefinite mixture of variable activity; and a similar uncertainty in its action is attributed to amorphous digitalin, owing to the variation in the proportion of active glucoside contained in it. He therefore recommends that physicians in prescribing one of these principles should confine themselves to crystallized digitalin.

Therapeutic Value of Crystallized Digitoxin. E. Merck. (*Zeitschr. des oesterr. Apoth. Ver.*, July 1st, 1895.) The author points out that the following digitalis constituents have hitherto been regarded in Germany as best adapted for medicinal use:—

1. *Digitalinum purum pulver. germanicum.*
2. *Digitalinum purum amorphum (Digitaline chloroformique).*
3. *Digitoxinum crystallisatum.*

In addition to these, a preparation under the name *Digitaline française cristallisée*, corresponding to the type of Nativelle's digitalin, has met with much favour in France. Until lately, digitoxin has not come much into use, owing to its extraordinarily powerful effects, though its definite and unvarying chemical composition and the uniformity of its physiological action afforded unmistakable indications of its claim to greater attention on the part of medical practitioners. Quite recently, however, this preparation has been brought prominently to the front by Masius and Corin, whose investigations show it to be very prompt and reliable in its action, and to be comparatively free from the drawback of producing gastric disturbance and other secondary effects.

Masius dissolves 0.1 gram of crystallized digitoxin in a solution of 55 grams of sugar in 740 grams of water mixed with 205 grams of alcohol of 90 per cent. strength. Of this solution he mixes

15 grams with 25 grams of simple syrup, and administers one-third of this mixture three times a day at intervals of four hours. Each dose therefore contains $\frac{1}{2}$ milligram of digitoxin.

Corin's solution, on the other hand, is made of 2 to 3 milligrams of digitoxin, 0.6 c.c. of chloroform, 12 c.c. of alcohol of 90 per cent., and a sufficiency of distilled water to make up 150 c.c. This quantity represents three doses.

Wenzel recommends the administration of digitoxin in the form of enemas, which mode of application still further reduces the risk of gastric disturbance, while the cardiac action is prompt and certain. The author (Merck), at the request of Prof. Unverricht, has prepared pastilles, each containing $\frac{1}{4}$ milligram of digitoxin incorporated with an indifferent excipient, which are perfectly soluble in water mixed with a sufficient proportion of alcohol. A solution of two of these pastilles represents the average dose for an enema.

Physiological Action of Extract of Suprarenal Capsules. G. Oliver and E. A. Schäfer. (*Journ. Chem. Soc.*, from *Proc. Physiol. Soc.*, 1895, 9-14.) An aqueous, dilute alcoholic, or glycerol extract of suprarenal capsules, when intravenously injected in small quantities into dogs or rabbits, produces—(1) an extreme contraction of the arteries; (2) a rise of arterial pressure in spite of cardiac inhibition, but which is increased by section of the vagi; (3) central vagus stimulation leading to standstill of the auricles, although the ventricles continue to contract with a slow independent rhythm; (4) acceleration and augmentation of the heart's beat, best marked in the auricles after section of the vagi; (5) respiration is slightly shallower. The effects last while the injection lasts, but do not terminate fatally in dogs. The peripheral constriction of the arteries is shown by the plethysmograph applied to the limbs, or the oncometer applied to the kidney. Stimulation of the depressor nerve fails to produce its usual result while the injection lasts. On the isolated frog's heart, solutions of 5 per cent. are necessary to produce results. The effects on voluntary muscles is not marked, but on electrical stimulation through their nerves there is delay in relaxation. It is considered probable that the active material is taken up by and stored within the muscles. The toxic properties are possessed by the medulla, not by the cortex of the suprarenal capsules. The suprarenals of man act similarly except in cases of Addison's disease, where they give an entirely negative result. Gastric digestion does not impair the activity of the extract.

The evidence obtained leads to the view that the suprarenal bodies are secretory rather than destructive, and the secreted product is in all probability of great physiological importance for maintaining the tonicity of the muscular tissues in general, and especially of the heart and arteries.

The Physiologically Active Substance occurring in the Suprarenal Gland. B. Moore. (*Proc. Physiol. Soc.*, 1895, 14-17.) This substance is probably a powerfully reducing material found only in the medulla of the gland, and first described by Vulpian. It gives a dark green or blue colour with ferric chloride, passing through purple to a dark red on the addition of ammonia or sodium carbonate. With chlorine, bromine, or iodine water, peroxide of hydrogen or alkalies in the presence of oxygen, it gives a rose-red coloration discharged by sulphide of hydrogen or ammonium.

It is insoluble in organic solvents like alcohol, ether, or benzene; it is soluble in water and dilute acids. It is found only in the suprarenal capsule, or after death in the blood of the suprarenal vein. Its presence in physiologically active extracts was constant; when absent, the extracts gave a negative physiological result.

It has not yet been separated, and its characters are largely negative; it has not been identified. It is not attacked by acids, or by boiling for some minutes, but it is destroyed by alkalies, by oxidising agents, and by prolonged boiling. It is not precipitated by alcohol, saturation with ammonium sulphate, by mercuric chloride, potassio-mercuric iodide, or tannic acid. It does not reduce Fehling's solution, even after boiling with mineral acids, nor does it form a crystalline compound with phenylhydrazine. It is not volatile either alone or with aqueous vapour. It dialyses freely through parchment paper, and the highly active dialysate is free from proteïds.

D. N. Nabarro (*Proc. Physiol. Soc.*, 1895, 17, 18) has extracted the proteïds from suprarenal capsules by means of a 5 per cent. solution of magnesium sulphate, and finds them to be chiefly globulins and nucleo-albumins. Pepsin and peptone are absent, and albumin is only present in small quantities.

Anthelmintic Properties of Papain. Dr. Bartholow. (*Amer. Drugg.*, from *La Méd. Mod.*) The author reports that papain administered in doses of 10 grains three times daily after meals is an efficient tænicide, which has proved successful in cases where the usual remedies had failed.

The Hypnotic Action of Trional. Dr. Gaillard. (*Bull. Gen. de Thérap.*, cxxvii. 426.) The author reports favourably on the hypnotic action of this remedy, which seems to be particularly serviceable in the insomnia of patients suffering from neurasthenia, morphinomania, and from cardiac and tuberculous affections. It is usually administered in cachets in doses of one gram. The sleep induced by it is stated to be of a perfectly normal nature.

Therapeutic Application of Ferratin. O. Schmiedeberg. (*Chem. Centr.*, i. 741.) Compare *Year-Book of Pharmacy*, 1894, 192. Ferratin, a "ferrialbuminic acid" containing 6 per cent. of iron, is obtained by boiling pig's liver with water, and adding tartaric acid to the cold filtrate. The ferratin contained in the liver is the source of iron for the formation of blood, and its disappearance from the liver can be detected in cases of deficiency of iron and loss of blood. Iron salts are, as a rule, difficult to assimilate; ferratin, however, after repeated doses, is not injurious either to the intestines or kidneys; and much larger quantities of iron may be injected directly into the blood in the form of ferratin than in the form of iron salts.

The Relative Therapeutic Value of Ferratin and Albuminate of Iron. J. O. Schlotterbeck and S. R. Boyce. (*Amer. Journ. Pharm.*, October, 1894, 500, 501.) Ferratin has been stated to possess decided advantages over other artificial albuminates of iron as a therapeutic agent. In order to test the validity of this claim the author has compared albuminate of iron and ferratin both with regard to their general properties and their behaviour with artificial gastric juice. His results are tabulated as follows:—

Albuminate of Iron.

Pale red powder.
Iron 2.1 per cent.
Insoluble in water.
Soluble in dilute alkalis.
Soluble in dilute acids.

With $(\text{NH}_4)_2\text{S}$ begins to blacken in 5 seconds.

Pepsin and HCl convert 43 per cent. of the iron into ferrous and ferric chloride by one digestion.

By removing the peptones, etc., and subjecting to second digestion, 42 per cent. more of the iron is converted into the inorganic form, or a total of 85 per cent. of the original iron.

Ferratin.

Dark brown powder.
Iron 5.4 per cent.
Insoluble in water.
Soluble in dilute alkalis.
Soluble in dilute acids.

Begins to blacken in 20 seconds with $(\text{NH}_4)_2\text{S}$.

Pepsin and HCl convert 37 per cent. of the iron into ferrous and ferric chloride by one digestion.

By subjecting to same operation, 43 per cent. more of the iron is converted into the inorganic form, or a total of 80 per cent. of the original iron.

In the author's opinion ferratin possesses no great advantages over ordinary albuminate of iron.

Ferrum Caseinatum (Ferrum Nucleoalbuminatum). L. Dawydow. (*Rep.*, 1895, 145.) This preparation is claimed to have advantages over the ordinary albuminate of iron, in being more easily prepared and more readily digestible. It is odourless and tasteless, insoluble in water, soluble in weak alkaline solutions, and contains 5.2 per cent. of oxide of iron. It dissolves rapidly when treated with artificial gastric juice. It is prepared by precipitating casein from skimmed milk by means of the smallest proportion of acetic acid required; the precipitate is repeatedly washed with warm water and then with alcohol to remove any adhering acid and sugar of milk, and is then freed from every trace of fat by extraction with ether in Soxhlet's apparatus. One part of the pure casein is now intimately mixed with one part of calcium carbonate and 100 parts of warm water, the mixture filtered, and the filtrate (containing a calcium caseinate in solution) precipitated with a slight excess of a freshly prepared 1 per cent. solution of lactate of iron. The precipitate is white at first, but turns flesh-coloured on drying.

Carniferrin. (*Chemist and Druggist*, February 2nd, 1895.) This name is given to a nutritive and hæmatinic preparation consisting of 30 per cent. of iron in combination with phosphocarnic acid, a constituent of flesh (see this volume, page 74). It is tasteless, miscible with both acid and alkaline solutions without decomposition, and is readily absorbed in the system. The daily dose for children is 3 to 5 grains, and for adults 8 grains.

Value of Toluol as a Remedy for Diphtheria. Prof. Löffler. (*L'Union Pharm.*, xxxv. 538, from *Deutsch. Med. Wochenschr.*) The author reports very favourably on the efficiency in diphtheria of a mixture of 36 c.c. of a toluol solution of menthol with 60 c.c. of absolute alcohol and 4 c.c. of solution of ferric chloride. The menthol is added to render the application less painful. The remedy is applied locally every 3 hours until the temperature becomes normal, after which it is applied 3 times daily. It is stated to possess in a remarkable degree the power of checking the development of the bacilli and of destroying those already formed. It can be kept in a stoppered bottle for several months without losing its efficiency.

Salactol, a Remedy for Diphtheria. (*Pharm. Journ.*, 3rd series, xxv. 434.) The preparation introduced under this name consists of the sodium salts of salicylic and lactic acids. When dissolved

in a 1 per cent. solution of hydrogen peroxide, it is recommended as a valuable remedy for diphtheria, which Dr. Walle and other physicians find to be more effectual than the anti-diphtheritic serum of Behring. The solution is applied to the throat with a brush every four hours, and in the intervals the solution is used as a gargle. It is also stated to act as a prophylactic.

Anti-Diphtheritic Serum : Antitoxin. (From *Brit. Med. Journ.*)

The following is a short sketch of the development of a new system of anti-diphtheritic treatment promising to prove of far-reaching importance, and involving principles capable of application in other equally important directions.

The use of an anti-diphtheritic serum was first introduced by E. Behring, of Halle, and subsequently developed by Roux, of the Pasteur Institute. The first step in the process consists in the cultivation of the diphtheria bacillus (obtained from a patient) in flasks of bouillon exposed to the air at a temperature of 37° C. This operation is usually allowed to go on for several months, in order to accumulate a quantity of the poison, but, according to Roux, who conducts the cultivation in moist air, it may be accomplished in three weeks. The resulting solution is passed through a porcelain filter, which arrests the bacilli and yields a clear, intensely poisonous solution.

The next step is to render the blood of animals such as horses, cows, sheep, or goats immune to the poison by injecting subcutaneously small quantities at a time until the desired result is attained. Horses are, however, much preferred to other animals for this purpose. The treatment consists in injecting a small quantity of the poisonous liquid into the upper part of the neck, beginning with such a small amount as to produce no ill effects. If the solution is too active, its strength is reduced by exposure, for a few minutes, to a temperature of 65° to 70° C., or it may be treated with a small quantity of solution of iodine in potassium iodide. In the course of a few days, the strength and frequency of the injections are gradually increased, and in a few weeks the animal is able to bear large doses without injury. When this condition has been reached, the horse is bled to the extent of 1-1½ litres; as much as 10 litres have been drawn from one horse during two days, and the average for each animal varies from 25 to 50 litres a month. Behring states that a horse from which he had drawn blood at frequent intervals during four years, remained in good physical condition. After the horse has been immunized, it may be so retained by occasional injections of the poison. As a

rule, twenty days are allowed to elapse after the injection before blood is drawn. When the blood is withdrawn, it is cooled and allowed to stand until clotting takes place, whereby the fibrin and corpuscles are removed and a clear serum is obtained.

This anti-diphtheritic serum is what is now known as antitoxin. It is a clear, yellowish-coloured liquid, and may be concentrated to dryness in a vacuum without undergoing change. It is preserved by drying in this manner, or by the addition of carbolic acid. It is also sometimes preserved by the addition of a small lump of camphor to each bottle of the liquid. The dried antitoxin, when wanted for use, is dissolved in eight or ten parts of water. Age is said to improve the serum, by lessening its tendency to cause in some patients a slight eruption of the skin.

Administration.—Antitoxin is administered subcutaneously from a special syringe of a pattern admitting of complete sterilization. Most of the serum which is produced has an immunizing power of 1 to 50,000; or 1 c.c. of the serum is sufficient for 50 kilograms of body weight. The dose is 15 to 20 c.c., repeated in about twenty-four hours, the two injections being sufficient for most cases.

So far the results obtained with this treatment have been most encouraging.

Cancer Antitoxic Serum. C. Richet. (*Amer. Drugg. and Pharm. Rec.*, May 25th, 1895.) The author has presented to the Paris Académie des Sciences a report of the successful treatment of two cases of cancer by means of an antitoxic serum prepared as follows:—An osteo-sarcoma of the leg was removed, the tumour well rubbed up in a mortar with a little water, the liquid filtered through linen and injected into three animals (an ass and two dogs). 5, 7, and 15 days afterwards the blood was drawn and the serum separated.

Anti-Syphilitic Serum. (*Zeitschr. des oesterr. Apoth. Ver.*, June 1st, 1895.) Syphilis is known only to attack man and not to be transferable to animals. This fact led Bayet to the supposition that animal blood must contain a substance antagonistic to the syphilitic poison. He therefore endeavoured to cure the disease by injections of pure serum of cows and sheep, and found that after treatment with six injections beginning with 2 and ending with 8 c.c., and applied at irregular intervals during a period of 15 days, the syphilitic eruptions had disappeared.

Pellizari has endeavoured to attain the same end by another method, consisting in the application of injections of lymph from a syphilitic patient. Of this he administered 1 c.c., at first every

third day, and subsequently every day. Massa has proceeded on similar lines, differing only in this way, that the syphilitic poison was first injected into animals, and the serum of the latter afterwards employed for treatment.

All these methods of treatment require fuller investigation. Up to the present, injections of pure animal serum have given the best results.

An Antitoxic Serum for Snake Poison. T. R. Fraser. (*Brit. Med. Journ.*, June 15th, 1895.) The author reports the results he has obtained with the serum of animals rendered immune to the poison of the cobra, rattlesnake, and other poisonous serpents, representing the most deadly of the Ophidia of Asia, America, Africa, and Australia. Previous investigators have already shown that animals can be rendered proof against snake poison by the repeated administration of graduated doses of the venom. These results are confirmed by the author, who proves in addition that the blood-serum of animals thus rendered immune possesses definite antidotal properties. Experiments made on various animals with the venom of each of the four varieties have so far given very encouraging results. He has also investigated the differences in the effects of the four kinds of venom, and further established the important fact that an animal protected against one form of poison is likewise rendered resistant to the others.

The author intends to test the efficacy of this treatment on man, and his further results will be awaited with considerable interest.

Immunity against Curare Poisoning by Inoculation with the Blood of the Salamander. MM. Phisalix and Contejean. (*Chemist and Druggist*, January 26th, 1895.) The authors have discovered that the salamander enjoys an extraordinary immunity against curare, eighty times as much being required to kill the salamander as the frog. The immunity of the former appears to be due to some substance in the blood which neutralises the poison, and in support of this hypothesis the authors show that a mixture of salamander-blood and curare does not act on the frog. The immunising substance exerts a physiological, and not a chemical, action on the curare, for by inoculating frogs with salamander-blood twenty-four hours before the injection the animal can withstand a much larger dose than when the blood has been mixed with the curare previous to the injection.

Potassium Permanganate as an Antidote to Opium. J. Carpenter. (*Therap. Gazette*, March 15th, 1895.) Further evidence is adduced by the author confirming the value of permanganate of

potassium as an efficient antidote to opium. An interesting instance of its action is described in the paper.

The Incompatibility of Antipyrine with Spirit of Nitrous Ether. M. F. Schaak. (*Amer. Journ. Pharm.*, July, 1894.) As these two preparations are only incompatible in the presence of free nitrous acid, the author proposes the neutralisation of any acidity in the spirit by means of potassium bicarbonate, whereby the formation of nitroso-antipyrine is prevented.

Gallicin, a New Therapeutic Agent. C. Mellinger. (*Pharm. Centralhalle*, April 25th, 1895.) Gallicin, $C_8H_8O_5$, is the methyl-ester of gallic acid, and is prepared by gently heating a methyl alcohol solution of gallic acid with strong sulphuric acid, allowing to cool, and purifying the crystals thus obtained by recrystallization from methyl alcohol or from hot water. From the former it crystallizes in anhydrous rhombic prisms, from the latter in white, lustrous needles, fusing at 200° to 202° C. It is recommended in the treatment of catarrhal affections of the eye, and is applied in the form of powder by means of a small camel-hair brush.

Lysidin. M. Grawitz. (*Deutsch. Med. Wochenschr.*, 1894, 786.) The new remedy introduced under this name to the notice of the medical profession is an artificial base of the formula $C_4H_8N_2$, obtained in the form of hydrochloride by heating ethylene diamine hydrochloride with sodium acetate. It forms pale red crystals, easily soluble in water, and is stated to possess a very powerful solvent action on uric acid. It is therefore recommended in the treatment of gout, calculi, and uric acid diathesis generally, and is administered in doses of 15 to 80 grains daily, dissolved in aerated water.

Lactophenin. R. Jaksch. (*Journ. de Pharm. et de Chim.* [5], xxix. 415.) This antipyretic may be regarded as phenacetin in which the acetic residue is replaced by that of lactic acid. It is a white, odourless powder, slightly soluble in water, and is employed by the author in doses of 5 to 15 grains 3 or 4 times daily in the treatment of typhoid fever. Large doses are stated to produce hypnotic effects.

Citrophene, a New Antipyretic. J. Roos. (*Deutsch. Med. Wochenschr.*, 1895, No. 26.) The preparation introduced under this name as a new antipyretic and antineuralgic is a compound of citric acid with *p*-phenetidin, and has the following composition:—



It is a white powder, tasting of citric acid and fusing at 181° ; it is soluble in about 40 parts of cold and 50 parts of boiling water. Acids and alkalies split it up into its constituents.

Physiological experiments have shown that even in quantities of 6 grams per day it is harmless and produces no unpleasant secondary effects. It is usually given in single doses of 0.5 to 1.0 gram, in which it has proved very thoroughly efficient. When taken at bedtime it also exercises a sedative action. In cases of headaches and neuralgia, doses of 0.5 gram are sufficient.

Separation of Synthetic Remedies. M. Lenzinger. (*Amer. Drugg. and Pharm. Rec.*, from *Pharm. Post*, xxviii. 180.) The author has examined the behaviour of several of the new synthetic remedies when treated according to Dragendorff's shaking-out method. From an acid solution petroleum spirit removed guaiacolbenzol, guaiacol salicylate, benzonaphthol, aliphol, agathin, salacetol, methylsalol, orthocresalol, paracresalol, metacresalol, benzocresalol, malakin and thermodin, but traces only of guaiacol cinnamate and naphthol carbonate. Benzol removed salophen, pyrodin, guaiacol cinnamate, lactophenin, β -naphthol-carbonate, gallanol; after previous boiling with hydrochloric acid, neurodin, malakin, thermodin, and traces of analgene. Chloroform dissolved pyrodin and analgene. From an ammoniacal solution petroleum spirit removed phenocoll; benzol, tolypyrine; chloroform, analgene; amylic alcohol, gallanol.

Assay of Alkaloidal Drugs. L. F. Kebler. (*Proc. Amer. Pharm. Assoc.*, 1894.) In the table on p. 184 the author gives the maximum, minimum, and mean results obtained with the majority of the practical gravimetric processes, Mayer's reagent, and volumetric acid solutions. The numbers given represent percentages.

The methods of procedure generally employed were those outlined in Allen's *Com. Organic Anal.*, Prescott's *Organic Anal.*, Lyon's *Pharmaceutical Assay*, Dragendorff's *Die Chemische Werthbestimmung starkwirkender Drogen*, and later methods not yet collected and placed in text-books.

A perusal of the results given in the foregoing table shows the desirability of a more uniform system of assaying the various alkaloidal plants and their preparations.

With regard to the indicators, it is stated that methyl orange can be used generally in titrating the alkaloids with mineral acids. Litmus and phenolphthaleïn are applicable to the strongly basic alkaloids, but are worthless for the feebler ones. Lacomoid has been employed by Van Itallie for titrating certain alkaloids

Substance.	Gravimetric.			Mayer's Reagent.			Volumetric Acid.			Deci-normal Factors.
	Maxi-mum.	Mini-mum.	Mean.	Maxi-mum.	Mini-mum.	Mean.	Maxi-mum.	Mini-mum.	Mean.	
Aconite Root	1.140	1.060	1.100	1.320	1.261	1.210	1.013	0.937	0.975	0.0647
Fl. Ext. Aconite Leaves . . .	0.431	0.301	0.366	0.428	0.315	0.371	0.297	0.193	0.242	0.0647
Fl. Ext. Aconite Root	0.825	0.700	0.763	0.975	0.923	0.949	0.645	0.605	0.625	0.0647
Fl. Ext. Belladonna Leaves (a) .	0.493	0.401	0.447	0.781	0.763	0.772	0.223	0.214	0.228	0.0289
Fl. Ext. Belladonna Leaves (b) .	0.356	0.325	0.341	0.349	0.325	0.337	0.315	0.303	0.309	0.0289
Fl. Ext. Belladonna Root . . .	0.350	0.350	0.350	0.376	0.357	0.366	0.331	0.317	0.324	0.0289
Fl. Ext. Blood Root	1.710	1.531	1.620	1.135	1.091	1.113	Too much	much	colour.	
Fl. Ext. Cinchona Red	5.134	3.562	4.343	Unreliable.			4.521	3.833	3.142	0.0314
Fl. Ext. Cinchona Comp. . . .	1.844	1.524	1.684	Unreliable.			1.315	1.013	1.464	0.0314
Fl. Ext. Coca Leaves	0.627	0.456	0.541	Unreliable.			0.621	0.440	0.531	0.0303
Fl. Ext. Colchicum Root . . .	0.397	0.352	0.374	0.647	0.561	0.604	Unsat.	is factory.		0.0309
Fl. Ext. Colchicum Seed . . .	0.707	0.453	0.580	0.971	0.646	0.808	Unsat.	is factory.		0.0309
Fl. Ext. Conium Fruit	0.776	0.631	0.653	Unreliable.			0.680	0.521	0.600	0.0127
Fl. Ext. Geisemium	0.397	0.314	0.355	0.497	0.450	0.478	0.367	0.301	0.334	0.0408
Fl. Ext. Guarana	3.809	3.746	3.777	Does not	pre	capitate.	Imprac-	ticable.		
Fl. Ext. Henbane	0.179	0.114	0.146	0.308	0.212	0.260	0.152	0.112	0.132	0.0289
Fl. Ext. Hydrastis, Berberine .	2.839	2.756	2.847	Unsat.	is factory.		2.536	2.431	2.483	0.0335
Fl. Ext. Hydrastis, Hydrastine .	2.000	1.931	1.965	Unsat.	is factory.		1.634	1.457	1.545	0.0397
Ipecac. Root	2.800	2.000	2.400	2.693	2.000	2.346	2.481	1.933	2.207	0.0254
Fl. Ext. Ipecac. Root	2.371	2.163	2.212	2.265	2.192	2.223	2.133	2.002	2.062	0.0254
Fl. Ext. Jaborandi	0.621	0.533	0.577	Unsat.	is factory.		0.540	0.413	0.476	0.0208
Nux Vomica Bean	1.813	1.752	1.787	1.911	1.832	1.871	1.732	1.698	1.715	0.0364
Fl. Ext. Nux Vomica	1.698	1.631	1.664	1.496	1.401	1.448	1.521	1.501	1.511	0.0364
Solid Ext. Nux Vomica	15.421	15.129	15.275	15.020	14.800	14.955	15.231	14.963	15.097	0.0864
Powd. Ext. Nux Vomica	18.435	18.209	18.322	18.013	17.973	17.993	18.103	17.941	18.022	0.0864
Fl. Ext. Stramonium Seed . . .	0.473	0.397	0.435	0.375	0.356	0.365	0.385	0.312	0.348	0.0289
Fl. Ext. Stramonium Leaves . .	0.376	0.334	0.355	0.525	0.500	0.512	0.317	0.289	0.303	0.0289
Fl. Ext. Veratrum Viride . . .	1.045	0.400	0.722	1.361	1.134	1.247	1.030	0.137	0.583	0.0687

with hydrochloric acid, and E. Dieterich uses rosolic acid. Keller, in his report on the valuation of drugs, employs hæmatoxylin as indicator and hydrochloric acid for titrating. Brazil wood has recently been reported as very efficient, and adopted by the United States Pharmacopœia of 1890 for titrating nux vomica and its preparations, but cochineal has proved most satisfactory in the author's hands for all alkaloids. Either cochineal or methyl orange are best employed in solution in dilute alcohol.

Whenever the alkaloidal residue extracted from the drugs is contaminated with much colouring matter, it is most useful to adopt the following directions suggested by A. H. Allen:—Dissolve the residue in a small quantity of ether, transfer the solution to a small glass-stoppered cylinder, add a few cubic centimetres of water coloured with the indicator. The standard acid solution is gradually added in drops and the solution well agitated after each addition. Under these conditions the end reaction is easily determined, for the colouring matter in the upper ethereal layer presents a strong contrast to the colour of the aqueous stratum.

Semi-decinormal solutions of sulphuric and hydrochloric acids are recommended as of the most suitable strength. The acid is added in slight excess, and titrated back with a centinormal solution of potassium hydrate.

Standardised Preparations of Belladonna. R. A. Cripps. (*Pharm. Journ.*, 3rd series, xxv. 793-796.) The author gives a brief resumé of the literature of this subject, and then discusses the question whether or not the alcoholic extract would be the most satisfactory starting-point for a series of standardised preparations of belladonna. It is well known that this extract, like extracts in general, is liable to a gradual change in dryness and strength, and that a tincture and liniment made from it (or from a powdered extract) are darker in colour and more liable to deposit than the same preparations made by the B.P. process. For these and other reasons explained in the paper the author favours the view that a strong liquid extract would constitute a more satisfactory basis for other belladonna preparations of definite strength. In the course of his experiments he obtained a very satisfactory result by extracting $1\frac{1}{2}$ pounds of belladonna root (containing 0.50 per cent. of alkaloids), divided into four equal parts with a mixture of 7 volumes of rectified spirit and 1 volume of water by re-percolation, reserving the first 12 fluid ounces of percolate from the final percolator. This

extract contained 0·73 part of alkaloids in 100 fluid parts. It was found to be far better for the production of the liniment, but formed a still more satisfactory mixture on the addition of a small proportion of water. Having thus proved that a sufficiently strong liquid extract can be easily prepared, the next step was to settle the standards of strength, and to devise satisfactory formulæ for the various official preparations. With this object in view the author makes the following suggestions :—

The root itself should be required to contain from 0·4 to 0·6 per cent. of alkaloids.

The leaf need not be retained for the preparation of the tincture, which might very well be replaced by a root tincture. It is suggested that the present extract be retained on account of its very extensive use, but that in addition to this a standardised, powdered root extract of similar strength be introduced, so that in time the survival of the fittest would determine which is to remain official.

The *succus* might be omitted from the Pharmacopœia, as it is very little prescribed and cannot be readily standardised.

The alcoholic extract, as referred to above, should contain 3 per cent.

The liniment might contain 0·25 part in 100 fluid parts, this being more in accord with the proportion in the root than 0·20 per cent. as suggested by Ransom.

The tincture, as recommended by Farr and Wright and Barclay, might be one-tenth of the strength of the liniment.

In addition to these official preparations, glycerin of belladonna is largely used, and could be made from the liquid extract so as to contain 0·5 part in 100 fluid parts.

If these standards be accepted, the most convenient strength for the liquid extract will be 0·75 part in 100 fluid parts, and the following would be the formulæ of a full list of standardised official preparations, including the glycerin and powdered extract above suggested.

Emplastrum Belladonnæ.

Take of—

Liquid extract of belladonna	. 4 fl. ozs., or 100 c.c.
Resin plaster	} of each . . . 2½ ozs., or 62½ grams.
Soap plaster	

Evaporate the liquid extract of belladonna by the heat of a water-bath until it is reduced to 1 ounce (or 25 grams), then add

the plasters, previously melted, and mix the whole thoroughly together.

It contains 0·5 per cent. of alkaloids.

Extractum Belladonnæ Alcoholicum.

Take of—

Liquid extract of belladonna	21 fl. ozs., or 1050 c.c.
Sugar of milk in powder	a sufficiency.

Take 1 fluid ounce (or 50 c.c.) of the liquid extract of belladonna, evaporate it in a tared dish over a water-bath, until it is reduced to a moderately firm extract, and weigh. The difference between the weight of the extract and $\frac{1}{4}$ ounce (or 12·5 grams) will give the amount of sugar of milk required for 1 fluid ounce (or 50 c.c.) of the liquid extract.

Distil off the spirit from the remaining 20 fluid ounces (1000 c.c.) of liquid extract, add the required amount of sugar of milk as shown by experiment, and evaporate over a water-bath to a firm extract, which should weigh 5 ounces, or 250 grams. This extract will contain 3·0 per cent. by weight of the alkaloids of belladonna.

Extractum Belladonnæ Liquidum.

Take of—

Belladonna root in No. 20 powder	2 pounds, or 1280 grams.
Rectified spirit,	
Distilled water	of each a sufficiency.

Divide the belladonna root into four equal portions, and damp the first with 6 fluid ounces (or 240 c.c.) of a mixture of 7 fluid parts of rectified spirit with 1 fluid part of distilled water; allow to stand in a covered vessel for six hours, then pack firmly and uniformly in a percolator. Pour over the surface of the powder 4 fluid ounces (or 160 c.c.) of the same mixture of spirit and water, and when the liquid begins to drop close the lower orifice of the percolator and allow to macerate for twenty-four hours. Now continue slow percolation, adding more of the same menstruum as required, and use the first 6 fluid ounces (or 240 c.c.) of percolate to damp the second portion of belladonna root. Collect the percolate in fractions of 4 fluid ounces (or 160 c.c.) each, or less, and having packed the second portion of moistened root in another

percolator, use the fractions of percolate successively for its extraction, carrying on the operation exactly as in the first percolator. The first 6 fluid ounces (or 240 c.c.) from the second percolator is used to damp the third portion of powder, and this system of re-percolation is carried out through the whole series of percolators. Reserve the first $12\frac{1}{2}$ fluid ounces (or 500 c.c.) of percolate from the fourth percolator and recover the spirituous liquor from the marc by displacement with water or pressure. This weaker percolate may be used instead of fresh menstruum when again preparing the liquid extract, or it may be concentrated to an extract, dissolved in rectified spirit, and added to the reserved portion of percolate.

Determine now the proportion of alkaloids in the reserved percolate by the following process:—

Introduce 10 c.c. into a separator, add an equal volume of chloroform with 50 c.c. of distilled water and a decided excess of solution of ammonia, agitate and set aside for the liquids to separate; draw off the chloroform and agitate the aqueous liquid with another 10 c.c. of chloroform, drawing off as before; repeat a third time, and reject the aqueous liquid. Agitate the mixed chloroform solutions thoroughly with 5 c.c. of dilute sulphuric acid, mixed with twice its volume of warm distilled water; separate the chloroform, and agitate with a second portion of acidulated water. Wash the mixed acid liquids with a little chloroform, then agitate vigorously with 10 c.c. of chloroform and an excess of solution of ammonia, drawing off the chloroform when it has separated. Repeat this agitation and separation twice with half the quantity of chloroform, wash with a small quantity of distilled water, draw off into a tared flask or dish, evaporate, dry, and weigh. Dissolve now the alkaloidal residue in 10 c.c. of HCl , and finally add

$\frac{\text{NaHO}}{100}$, till neutral, using methyl orange or iodeosine as indicator.

From this calculate the amount of alkaloids, 1 c.c. $\frac{\text{NaHO}}{100}$ being equivalent to .00289 gram of atropine. This should correspond closely with the amount found by weighing.

Add now to the remainder of the reserved percolate sufficient of the original menstruum to produce a liquid containing 0.75 part of alkaloids in 100 fluid parts.

Glycerinum Belladonnæ.

Take of—

Liquid extract of belladonna .	4 fl. ozs., or 100 c.c.
Glycerin	a sufficiency.

Evaporate the liquid extract by the heat of a water-bath until it is reduced to a soft extract, then add sufficient glycerin to make the whole measure 6 fluid ounces (or 150 c.c.), mixing thoroughly.

One hundred fluid parts will contain 0.5 part of alkaloids of belladonna.

Linimentum Belladonnæ.

Take of—

Liquid extract of belladonna .	10 fl. ozs., or 250 c.c.
Camphor	1 oz., or 25 grams.
Distilled water	2½ fl. ozs., or 62½ c.c.
Rectified spirit	a sufficiency.

Dissolve the camphor in 10 fluid ounces (or 250 c.c.) of the spirit, and mix the solution with the liquid extract and water, adding sufficient rectified spirit to produce 30 fluid ounces (or 750 c.c.). Allow to stand for twenty-four hours in a cool place, and decant or filter from any deposit.

One hundred fluid parts contain 0.25 part of the alkaloids of belladonna.

Pulvis Extracti Belladonnæ Compositus.

Take of—

Liquid extract of belladonna .	4 fl. ozs., or 100 c.c.
Sugar of milk in fine powder .	a sufficiency.

Evaporate the liquid extract by the heat of a water-bath until it is reduced to a soft extract; add now 2 ounces (or 50 grams) of sugar of milk, and rub well together. Dry the resulting paste at a temperature not exceeding 212° F. (100° C.), reduce it to fine powder, and add sufficient sugar of milk to bring the whole to the weight of 3 ounces (or 75 grams).

This preparation contains 1 per cent. of the alkaloids of belladonna, and corresponds in strength and dose to the green extract obtained from the fresh leaves. It should be kept in well-closed bottles.

Tinctura Belladonnæ.

Take of—

Liquid extract of belladonna . . . 1 fl. oz., or 30 c.c.
 Proof spirit 29 fl. ozs., or 870 c.c.

Mix, allow to stand for twenty-four hours in a cool place, and filter.

100 fluid parts contain 0.025 part of the alkaloids of belladonna.

Unguentum Belladonnæ.

Take of—

Liquid extract of belladonna . . . 1 fl. oz., or 20 c.c.
 Benzoated lard 2½ ozs., or 45 grams.

Evaporate the liquid extract on a water-bath until it is reduced to a quarter of an ounce (or 5 grams), add the benzoated lard, and mix thoroughly.

One hundred parts contain approximately 0.3 part of the alkaloids of belladonna.

Extractum Grindeliæ Robustæ Fluidum. M. Jürgens. (*Pharm. Zeitschr. für Russland*, 1895, 314.) Directions are given by the author for two distinct preparations.

Extractum Grindeliæ robustæ fluidum sine resina. 100 grams of the coarsely powdered herb are uniformly moistened with hot water, packed in a glass percolator, and slowly covered with a sufficient quantity of hot water to leave a visible zone of liquid above the surface of the powder. When the liquid begins to drop from the lower orifice, the latter as well as the top of the percolator is closed, and the contents are allowed to macerate for 12 hours. After this, percolation with hot water is started and slowly continued until the drug is exhausted. The first 60 grams of percolate are kept apart, and the remainder is evaporated in a porcelain dish to the consistence of a soft extract at a temperature not exceeding 50° C. This extract is now mixed with the above 60 grams of percolate and 25 grams of alcohol of 90 per cent., and sufficient water is added to the mixture to make up 100 grams of product, which is allowed to stand for some time and is then filtered.

Extractum Grindeliæ robustæ fluidum cum resina. 100 grams of the coarsely powdered flowering herb are exhausted by percolation with 750 c.c. of a mixture of 3 parts of alcohol of 90 per cent. and 1 part of water. The yield should be 100 grams.

Powdered Extracts. C. S. N. Hallberg. (*Amer. Journ. Pharm.*, October, 1894, 502.) The author has experimented with alcohol, methyl alcohol, and menstrua composed of alcohol and chloroform in varying proportions. The best results were obtained with a mixture of 75 volumes of alcohol and 25 volumes of chloroform. The percentages of dry extracts obtained ranged from 6 to 15 per cent., and these were in every case mixed with sufficient milk sugar to yield a product amounting to one-fourth of the weight of the drug operated upon. The powdered extracts prepared in this manner presented a homogeneous appearance, and remained in good condition on keeping.

Commercial Liquid Extract and Tincture of Cinchona. H. Brown. (*Pharm. Journ.*, 3rd series, xxv. 1180, 1181.) Of five samples of liquid extract examined, two proved fair approximations to the official standard of 5 per cent. of alkaloid, while the other three showed a much lower percentage. Samples of tincture also showed considerable variations in strength. Particulars will be found in the paper.

Note on the Alteration in the Amount of Extractive in Tinctures on Keeping. J. Barclay. (*Chemist and Druggist*, February 23rd, 1895, 274.) Fifteen of the most frequently used tinctures were examined after having been kept for periods varying from 26 to 167 days. The results of these experiments point to the conclusion that there is no serious loss of extractive in tinctures stored under ordinary conditions for a reasonable length of time. Details are given in the paper.

Assay of Syrup of Iodide of Iron. E. Bourquelot. (*Journ. de Pharm.* [6], i. 170.) The author's process is a modification of that of the U.S. Pharmacopœia, and consists in the addition of a measured excess of silver nitrate to the diluted syrup, and the subsequent estimation of the unprecipitated silver by means of decinormal solution of ammonium sulphocyanide.

Assay of Syrup of Iodide of Iron. W. Kubel. (*Apoth. Zeitung*, 1895, 389.) 20 grams of the syrup are diluted with an equal quantity of water in a 100 c.c. flask. 1 gram of pure dry sodium carbonate is then added and the mixture kept with occasional agitation, until the precipitation of the iron is just completed. Water is now added up to the mark in the neck, and the mixture filtered. 25 c.c. of the filtrate = 5 grams of the syrup, are then mixed with two drops of potassium chromate solution, and the iodide is titrated in the mixture with decinormal silver nitrate.

Each c.c. of the silver solution corresponds to 0.0155 gram of ferrous iodide.

Belladonna Plaster. P. Boa. (*Chemist and Druggist*, April 6th, 1895.) The author considers this plaster to have two objectionable features, being too soft and wanting in adhesiveness. He suggests the following proportions as giving a better preparation:—

	Parts.
Resin	5
Curd soap	2
Lead-plaster	11
Alcoholic extract of belladonna	2

Ointment of Mercuric Nitrate (Citrine Ointment). C. H. La Wall. (*Amer. Journ. Pharm.*, November, 1894, 525.) The author finds lard oil to be the best vehicle for the preparation of this ointment, and lays stress on the importance of carefully regulating the temperature during the process. He recommends the following *modus operandi* as yielding a very satisfactory and stable product:—Heat the lard oil to 100° C., then remove from the source of heat, add the nitric acid without stirring, and re-apply heat when effervescence ceases, till all the gas is expelled. It is best to use a vessel of six times the capacity of the quantity to be made, to allow for the copious effervescence which takes place. When the foregoing mixture has cooled to 40° C., the solution of mercuric nitrate is added and the temperature is raised gradually to 60° C., and maintained until no further evolution of gas is noticed. It is then agitated until cold.

The author also states that ointment made by the U.S.P. method, which has become spongy, may be remedied by elevating the temperature to 60° C. and cooling with agitation.

Note on Suppositories. H. Wyatt. (*Pharm. Journ.*, 3rd series, xxv. 790, 791.) The author refers to the trouble usually involved in the preparation of suppositories containing vegetable extracts. To obviate this he uses a wide-mouthed bottle (fitted with a good cork, or preferably, an india-rubber stopper) instead of a small capsule or suppository water-bath. The cacao butter is put into this bottle, warmed on a water-bath until liquefied, and then the thinned extract or other medicament added, the whole being shaken vigorously until ready to pour into the moulds. The author states that in this manner it is easy to get as much as 5 grains of extract into a 15-grain suppository.

Relative Merits of Different Pill Coatings. M. Dyson. (*Pharm. Journ.*, 3rd series, xxv. 678, 679.) The author has examined the merits of the following pill coatings with special regard to their relative solubility. The method employed was to coat a pill containing ferrous sulphate with the particular coating in question, and then place it in a beaker containing a dilute solution of potassium ferrocyanide at the temperature of the stomach. The following results were obtained:—

With silver leaf coating there was a distinct precipitate after twenty minutes. With sandarac or tolu varnish the coating cracked at certain places, and at those points, after twenty-five minutes, a precipitate was visible, but only at these points. The pearl coating first cracked and separated, but it was apparent that there was a varnish present underneath the pearl coating, and the precipitate appeared after an hour and a half. With gelatin coating the gelatin at once began to swell, and a distinct precipitate was observed in one minute. The author therefore advocates the use of gelatin coating, such as may be obtained by adding 3 parts of water to 1 part of the best gelatin, and melting in a water-bath.

NOTES AND FORMULÆ.

PART III.

NOTES AND FORMULÆ.

Observations on the Nature of Phosphorescence. H. Jackson. (*Journ. Chem. Soc.*, 1894, i. 734.) It is shown that the brilliancy of phosphorescent compounds is influenced by the method adopted in their preparation. Thus, lime prepared from pure precipitated calcium carbonate in the crystalline condition was strongly phosphorescent, but when the carbonate was rapidly heated while in the amorphous condition, the lime obtained from it hardly glowed at all. Similarly variable results were obtained in the case of barium carbonate, and it would, therefore, appear that "according to the conditions of its preparation, an apparently pure substance may or may not phosphoresce, or the colour of its glow may not always represent rays of the same range of wave-length."

Corrosion of Aluminium. A. Liversidge. (*Chemical News*, March 15th, 1895.) The author finds that though chemically pure aluminium remains perfectly bright when exposed to air and moisture, the commercial metal, of even the best quality, soon becomes tarnished by superficial oxidation, and therefore does not deserve the reputation for permanence which is generally accorded to it.

Protection of Iron against Rust. (From *Amer. Drugg. and Pharm. Rec.*) The surface of the iron is coated with a mixture of solution of tannin, and of some mucilaginous substance (such as dextrin, acacia, etc.), before applying any ordinary paint.

Simple Substitute for a Separator Funnel. D. Holde. (*Zeitschr. für analyt. Chem.*, 1895, xxxiv. 54.) An ordinary bottle or flask is fitted with a cork, through which pass two tubes. One of these, terminating inside level with the cork, is furnished with a stop-cock or pinch-clamp. The other, reaching to the bottom of the vessel, is there narrowed to a point, and serves to admit air. After shaking, the vessel is inverted, for drawing off the two layers separately.

Quebracho Wood as a Tanning Material. (From *Scientific American*.) The wood is used either in the form of chips or as an extract. The addition of alum and salt is stated to improve the extract for tanning purposes, and to make it equal or even superior to gambier for imparting a good colour to the leather.

Softening Hard Extracts. E. F. Young. (*Pharm. Journ.*, 3rd series, xxv. 228.) The author finds that a mixture of equal parts of glycerin and water answers well for softening hard, watery extracts, such as belladonna extract, previous to incorporating them with fats for suppositories or ointments. Glycerin alone is not suitable, owing probably to its hygroscopic nature as much as to its slippery character in the mortar or on the pill-slab. For resinous extracts such as that of *cannabis indica*, spirit proves to be the best softening agent.

Deodorising Recovered Alcohol. E. A. Kadel. (*Indiana Pharmacist and Western Druggist*. From *Pharm. Journ.*) The alcohol recovered from drugs (*arnica*, *buchu*, *cubebs*, etc., etc.) is first treated with caustic soda in the proportion of one ounce to each gallon. After standing for two to five days it is distilled in a water-bath or steam-jacket kettle. The alcohol first passing over must be returned to the still. This is continued until the odour is either changed or lost. Usually this distillation leaves an empyreumatic, and sometimes a soapy odour to the alcohol. It is then redistilled with potassium permanganate; the quantity to be used can be determined by experience alone, alcohol recovered from the same drug at different processes requiring different proportions; usually one to four drachms to a gallon is employed. Thus treated it is generally clean enough for re-employment for manufacturing purposes. If further purification is desired, the product is again distilled with the permanganate and filtered through freshly prepared animal charcoal. In the absence of the latter a small quantity of water may be added and distillation again resorted to after the second treatment with permanganate.

The Preparation of Superfatted Soap. C. D. Moffat. (*Pharm. Journ.*, 3rd series, xxv. 41.) Referring to the results of J. R. Johnson (see *Year-Book of Pharmacy*, 1894, 228), the author thinks that the calomel test cannot be relied upon as a satisfactory means of ascertaining the neutrality of soap. He prefers to determine the alkali-saturating power of the fat by heating one 'gram' with 20 c.c. of alcoholic solution of potash in a steam-bath until saponification is complete, then titrating the excess of alkali with

standard hydrochloric acid in the presence of alcoholic solution of phenolphthalein, and deducting the quantity of acid thus required from that required for neutralising the whole 20 c.c. of the alkali solution. He also points out that the strength of the caustic potash employed by Johnson in his experiments was not mentioned in his report.

In view of the probability that superfatted soap may become an article required by pharmacists, the author suggests that the method most suitable for the preparation of such a soap would be to regulate the proportions of fat and potassium hydrate according to the degree of superfatting desired in the soap. For this purpose the saturating power of the fat should be determined as above, and the amount of potassium hydrate in the caustic potash estimated. In the case of lard, 100 parts were found to require for saturation 19.63 parts of potassium hydrate; and from this proportion the quantity of caustic potash, of known strength, requisite for producing either a neutral soap or one containing any desired percentage of the fat in an unsaponified state, can be ascertained by a simple calculation.

The Preparation of Superfatted Soap. J. R. Johnson. (*Pharm. Journ.*, 3rd series, xxv. 169.) In reply to C. D. Moffat (preceding abstract), the author re-asserts the value and usefulness of calomel as a test for neutrality in soaps. He recommends it as simple, handy, and sufficiently accurate.

Application of Hydrogen Peroxide as a Preservative. M. Burbi. (*Pharm. Centralhalle*, xxxvi. 307.) Hydrogen peroxide is recommended by the author as one of the best and most harmless substances for preserving wine, beer, cider, vinegar, and other liquids, to which it need only be added in the proportion of 1 per cent. of the commercial solution.

Preservation of Fruit by Means of Alcohol. A. Petit. (*Zeitschr. des oesterr. Apoth. Ver.*, May 20th, 1895.) The author uses a cylindrical vessel or jar, fitted with a false bottom, which is covered with a layer of coarse wood-shavings or small chips. An open basin containing absolute alcohol is placed below this false bottom; the fruit is then put into the jar, and the latter covered with a lid fitting air-tight. Under the influence of the alcoholic vapour the fruit will thus keep perfectly fresh for a long time.

Suggested B.P. Emulsions. C. F. Henry. (*Pharm. Journ.*, 3rd series, xxv. 878, 879.)

Emulsio Olei Morrhuæ.

Gum acacia	1 oz.
Cod liver oil	4 ozs.
Elixir of saccharin	40 minims.
Oil of cassia	2 „
Hypophosphite of soda	16 grs.
Hypophosphite of lime	16 „
Distilled water	a sufficiency to make 8 fluid ozs.

Make a mucilage by dissolving the gum acacia in 2 ounces of the water. To this gradually add 2 ounces of cod liver oil, stirring constantly until a thick emulsion is formed; then add 1 ounce of water in which the hypophosphites have previously been dissolved, and stir in as before the remainder of the oil; add now the saccharin elixir and the oil of cassia; mix thoroughly and make up to 8 fluid ounces with water.

The author considers this preferable to the B.P.C. formula.

Emulsio Olei Ricini.

Gum acacia	$\frac{1}{2}$ oz.
Castor oil	1 „
Elixir of saccharin	20 minims.
Oil of almonds	2 „
Oil of cloves	3 „
Distilled water	a sufficiency to make 2 fluid ozs.

Dissolve the gum in the water and add the oil gradually; lastly add the flavouring.

Emulsio Olei Morrhuæ et Malti.

Gum acacia	1 oz.
Cod liver oil	4 ozs.
Liquid malt extract	4 „

Mix the malt extract with the gum acacia, let the mixture stand for four hours, then gradually stir in the cod liver oil. A few drops of saccharin elixir may be added.

This makes a good thick emulsion, containing nearly 50 per cent. of oil. A thinner emulsion may be made by dissolving the gum in 2 ounces of water, adding 1 ounce of liquid malt extract, and stirring in slowly 1 ounce of cod liver oil.

Emulsio Olei Morrhue cum Eucalypto.

Gum acacia	3 oz.
Cod liver oil	4 ozs.
Oil of eucalyptus	2 drs.
Elixir of saccharin	1 dr.
Oil of cassia	2 drops.
Distilled water	a sufficiency to make 8 fluid ozs.

Prepare like the first emulsion, adding the eucalyptus oil after the cod liver oil. The flavouring might be left out.

Some of these formulæ are intended for preparations which can be made up fresh when prescribed.

Application of Dulcin for sweetening Castor Oil. C. Bechert. (*Apotheker Zeitung*, ix. 951.) Dulcin is found to be slightly soluble in castor oil, cod liver oil, and other fatty oils, and is serviceable, especially in the case of castor oil, for imparting a sweet and pleasant flavour, masking, to some extent, the disagreeable taste of the oil.

Nutrient Enema of Cod Liver Oil. M. Revilliod. (*Zeitschr. des oesterr. Apoth. Ver.*, June 1st, 1895, from *Médecine Moderne*.) The following formula is suggested:—

Cod liver oil	600 grams.
Yolk of two eggs.	
Lime water	600 „

These are made into an emulsion, which is injected at bedtime, the dose being at first 60 to 70 grams, which is gradually increased to 100, 150, and 200 grams. Care must be taken that the enema is retained for the whole night, to ensure complete absorption of the oil in the system. Occasionally it is found necessary to add a small quantity of opium at the beginning of the treatment.

Aromatic Cod Liver Oil. E. Dieterich. (From *Chemist and Druggist*.) 0·1 part of coumarin and 1 part of vanillin are dissolved by gentle heat in a mixture of 50 parts of oil of lemon, 20 parts of oil of neroli, and 10 parts of English oil of peppermint. This solution is then added to 10,000 parts of cod liver oil.

Palatable Fluid Extract of Buckthorn. (*Amer. Drugg. and Pharm. Record*.)

Fld. extract of buckthorn	Oj.
Ammoniated glycyrrhizin	5ij.
Saccharin	5l.
Solution of potash	fl. 5ij.
Water	fl. 3ij.

Dissolve the saccharin and glycyrrhizin in the water, to which has been added the solution of potash and the fluid extract of buckthorn, and mix thoroughly. The product is free from nauseating or disagreeable taste.

Palatable Cascara Preparations. F. Edel. (*Chemist and Druggist*, January 26th, 1895. From *Amer. Drugg.*)

Cascara sagrada in coarse powder . . .	16 ozs.
Calcined magnesia	1½ "
Water	18 "
Rectified spirit	12 "
Proof spirit	a sufficiency.
Glycerin	2 ozs.

Make an intimate mixture of the cascara and magnesia, moisten with water, and macerate for several hours; pack the mixture in a percolator, and allow to macerate for forty-eight hours; then add 12 ozs. of spirit, and allow to macerate for twelve hours longer. Start percolation, using proof spirit; reserve the first 12 ozs., and continue percolation to exhaustion. Recover the spirit, evaporate to a soft extract, and dissolve in the reserved portion; then add the glycerin and make up 16 ozs.

The foregoing serves as a basis for the following elixirs:—

1.

Fluid extract of cascara (bitterless) . . .	3 ozs.
" " senna.	2 "
" " euonymus	1 oz.
" " liquorice	2 ozs.
Saccharin	60 grs.
Aromatic elixir, enough to make. . . .	16 ozs.

Mix.

2.

Fluid extract of cascara (bitterless) . . .	3 ozs.
" " rhubarb	1½ "
" " senna	1½ "
" " liquorice	2 "
Saccharin	60 grs.
Aromatic elixir, enough to make	16 ozs.

Mix, and filter if necessary.

Aromatic Syrup of Liquorice. M. F. Hassebrock. (*Amer. Drugg. and Pharm. Record.*) The syrup prepared according to the following formula is intended for disguising the bitter taste of quinine:—

Cinnamon (Ceylon)	20·00	grams.
Ginger (Cochin)	12·00	„
Cloves	8·00	„
Nutmeg	3·00	„
Ext. liquorice, purified	50·00	„
Sugar	750·00	„
Alcohol and water, each	a sufficient quantity.	

Reduce the cinnamon, ginger, cloves, and nutmeg to a No. 40 powder, moisten with 15 c.c. of alcohol, macerate for twenty-four hours in a covered vessel, then pack into a cylindrical percolator and gradually pour alcohol upon it until 100 c.c. of percolate are obtained; mix this with the sugar in a mortar, and set aside in a moderately warm place until the alcohol has evaporated.

Add water till 500 c.c. of percolate are obtained; dissolve the extract of liquorice in the percolate with the aid of gentle heat, add the aromatized sugar, heat until boiling, strain, and add enough water through the strainer to make up 1,000 c.c.

Aromatic Elixir of Kola. (*Amer. Drugg.*, 1895, 365.) The following formula is stated to yield a very satisfactory and palatable preparation:—

Fld. extract of kola	3ij.
Ammoniated glycyrrhizin	5j.
Saccharin	5j.
Water	fl. ʒviij.
Alcohol	fl. ʒiiiss.
Simple syrup	fl. ʒiiiss.

Dissolve the ammoniated glycyrrhizin in the water, and in this dissolve the saccharin; now add the syrup and alcohol, followed by the fluid extract of kola, to which has been added a few drops of oil of orange. Set aside, with occasional shaking during five or six hours; then filter and bring its bulk up to 1 pint with simple elixir.

Galenical Preparations of the Phosphoglycerates. (*Amer. Drugg.*, from *Petit Moniteur de Pharm.*) The phosphoglycerates of sodium, potassium, calcium, magnesium, and iron are recent introductions to therapeutics. The calcium salt, which is the one most employed, is finely crystalline, soluble in cold water, difficultly soluble in boiling water, and insoluble in alcohol. It is administered in a variety of forms.

Solution of Calcium Glycerophosphate.

Calcium glycerophosphate	10-30	grams.
Distilled water	q.s.	

for 1,000 c.c. of solution. Dissolve and filter. Ordinary water should not be used.

The salt takes a little time to dissolve. Solution may be hastened by the addition of 1 gram of citric acid to every 10 grams of salt, but solutions prepared after this method do not keep long without change.

The addition of 2 or 3 grams of chloroform to each litre of solution, where the use of chloroform is not contra-indicated, corrects the taste and renders the solution more agreeable, besides preserving it against decomposition.

Effervescent Solution of Calcium Glycerophosphate.

Calcium glycerophosphate	10-30 grams.
Citric acid	5-7 „
Sodium bicarbonate	4 „
Distilled water q.s. ad	1,000 c.c.

Dissolve the glycerophosphate and the acid in the water contained in a suitable container; add the bicarbonate of soda and cork immediately. Tartaric acid should not be substituted for the citric acid, as it produces a precipitate.

Syrup of Calcium Glycerophosphate.

A strong syrup of calcium glycerophosphate cannot be prepared, owing to the feeble solubility of this salt in cold water.

Calcium glycerophosphate	10 grams.
Citric acid	1 gram.
Sugar	610 grams.
Water	310 „

Dissolve the salt and the acid in the water, and in this dissolve the sugar by agitation in the cold, adding sufficient simple syrup to bring up the bulk to 1,000 grams. Any aromatic syrup may be employed instead of simple syrup, or an extract combined with glycerin as follows :—

Extract of kola	10 grams.
Extract orange, bitter	5 „
Glycerin	50 „

Dissolve the two extracts in the glycerin with heat; allow to cool; add the syrup, and filter.

Chocolate Tablets of Calcium Glycerophosphates.

Calcium glycerophosphate	0.15-0.30 gram.
Powdered chocolate	1.00 „
Syrup	q.s.

Mix the salt with the powdered chocolate, and mass with just the requisite amount of syrup to make one tablet.

Mistura Quinini Effervescens. (From *Nouv. Rem.*)

Quin. sulph.	. . . . .	0·12 gram.
Acid. citr.	. . . . .	0·6 „
Elixir aurant.	. . . . .	āā 2·0 grams.
Syrup aurant.)	. . . . .

This mixture represents one dose, which is to be taken in a glass of water containing 0·6 gram of sodium bicarbonate in solution.

Effervescing Citrate of Iron. M. Ronde. (*Pharm. Wochenschrift.* From *Chem. and Drugg.*)

Ferri ammonio-cit.	. . . . .	ḡiss.
Sodii bicarb.	. . . . .	3viiss.
Acidi citrici .	. . . . .	3vj.
Pulv. sacch. alb.	. . . . .	3xv.

Mix the dry powders. Separately dissolve ferri am. cit. ḡiss. in aqua 3v., and acid. citric. ḡiss. in S.V.R. 3iij. Mix, and make the powder into a paste with the mixture and as much S.V.R. as is required. Rub this paste through a suitable-sized sieve, and dry the granules.

Syrupus Mangani Oxidati Saccharati. (*Chem. and Drugg.*, February 9th, 1895.)

Potass. permang.	ḡiiss.
Aq.	3xvj.

Dissolve, and add—

Syrup.	3ij.
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Set aside for a few hours, then bring the liquid to the boil, and collect the precipitate on a filter. Wash the magma once with a little distilled water, then press it out gently, and mix with—

Sacch. alb.	. . . . .	3iij.
Sol. sodæ (s.g. 1·333)	. . . . .	5j.

Heat on a water-bath until clear, and add water to make the whole weigh 6 ozs. avoirdupois.

The syrup contains about 2 per cent. of manganese.

Digestible Milk. R. T. Edes. (*New York Medical Record.*) A pint of milk is gently warmed, and whilst it is constantly stirred 20 minims of dilute hydrochloric acid are dropped into it very slowly. If the milk is then stirred until cool, a very fine

flocculent coagulum is produced, which floats in the whey and is easily accessible to the digestive secretions, while the whole fluid is more palatable. Special advantages of the method are that the casein is retained and used, and the milk is not bitter as when pancreatised.

New Medicinal Agents. (*Pharm. Centralhalle.* From *Pharm. Journ.*, 3rd series, xxv. 434, 435.) *Antitetraizine* is a derivative of quinine which has been employed by Zambelletti in the treatment of influenza, rheumatic and neuralgic affections, etc., in doses of from 3 to 4 grains (12 to 23 grains in the twenty-four hours). *Bismuth Sulphite*, used by Cæsarís and Racchetti as an antiseptic in the treatment of fermentive disorders of the stomach and intestines, and for dislodging worms (*Boll. chim. farm.*). *Calcium Borate*, used by Alberta in the treatment of eczema, burns, offensive perspiration, and internally for infantile diarrhœa, in doses of from 4 to 6 grains (*Orosi*). *Chloriodolipol*.—A chlorinated derivative of phenol creasote and guaiacol, used by Zambelletti as an inhalation in chronic affections of the respiratory organs. *Extract of Hemp*.—This is a dietetic preparation introduced by T. Barthelson for the use of consumptive patients, etc. According to an analysis by L. Spiegel, it consists of:—

Starch	51·0
Albuminous substances	29·5
Fat (hemp oil)	8·0
Ash	1·0
Water	10·5

Salifebrin, or *Salicylanilide*, is a white powder probably consisting of a mixture of acetanilide and salicylic acid, insoluble in water, but soluble in alcohol. *Sublimophenol*: colourless crystals, consisting of a mixture of mercuric chloride and phenolate, prepared, according to Desesquelle, by mixing molecular proportions of potassium phenolate and mercuric chloride. The reddish precipitate first formed becomes yellow and then white. After washing, it is crystallized from alcohol. The crystals melt at 210° C. with decomposition (*Pharm. Zeit.*). *Unguentum Vegetabile* is an ointment basis introduced by Koch and Becker, consisting of an emulsion of vegetable wax, oil, borax, and water. It is recommended on account of its durability, antiseptic action, and capacity of taking up water.

Ferripyrine, a New Hæmostatic and Astringent. (*Münch. Med. Wochenschr.*, xlii. 10; *Pharm. Journ.*, 3rd series, xxv. 755.) This name is applied to a compound of antipyrine and ferric chloride

represented by the formula $\text{Fe}_2\text{Cl}_6 \cdot 3(\text{C}_{11}\text{H}_{12}\text{N}_2\text{O})$, which is obtained as an orange-red powder forming a dark-red solution in water. It is stated to possess excellent hæmostatic properties, and to be free from causticity. It can be applied, either as a powder or in the form of a 20 per cent. solution, in all cases in which ferric chloride is indicated. It can likewise be administered internally in doses of 0.5 gram, and may possibly prove valuable for injections.

Airol. F. Lüdy. (*Apotheker Zeitung*, x. 63.) Airol (bismuth oxyiodogallate) is described as a pale greyish green, odourless and tasteless powder, unaffected by exposure to light, but gradually decomposed by water or moist air. Its composition is represented by the formula $\text{C}_6\text{H}_2(\text{OH})_3 \cdot \text{C}_2\text{O}_3 \cdot \text{BiO} \cdot \text{HI}$. It is soluble in dilute mineral acids and in alkaline hydrates, but insoluble in water and other ordinary solvents. With glycerin and water it forms a stable emulsion. Like dermatol, it is used as a substitute for iodoform, and combines the properties of both these substances. It is employed either as a dusting-powder or in the form of an ointment.

Tussol, a Remedy for Cough. (*Pharm. Centralhalle*, xxxv. 532.) The name tussol is applied to a saline compound of antipyrine and mandelic acid ($\text{C}_8\text{H}_8\text{O}_3$), and is chiefly recommended for relieving the cough of children. $\frac{1}{3}$ – $1\frac{1}{2}$ grain is given to children under 12 months, and 7 grains to children over 4 years. The dose may be repeated two or three times daily.

Tannigen. H. Meyer. (*Bull. com.*, viii. 373. From *Pharm. Journ.*) The author has applied the name "tannigen" to an acetylated compound of tannin. It is a greyish-yellow, tasteless, and inodorous powder, very slightly hygroscopic, insoluble in cold water, somewhat soluble in warm water, but dissolving readily in alkaline liquids, such as solutions of sodium phosphate, carbonate, or borate. When boiled with these solutions, it is decomposed into acetic and gallic acids. It is recommended for use in cases of chronic diarrhœa, its superiority to tannin depending upon the fact that it passes through the stomach unaltered, only exercising an astringent effect in the intestines, where it is decomposed by the alkaline fluids present. It may be given in doses of three to four grams daily for a prolonged period without causing any inconvenience.

Aluminium Boroformate, a New Astringent Antiseptic. J. Martenson. (*Chemist and Druggist*, February 2nd, 1895.) The author describes this substance as possessing good, though mild antiseptic and astringent properties. It has recently been suc-

cessfully used in the Oldenburg Children's Hospital at St. Petersburg, and is obtained by saturating a solution of two parts of formic acid and one part of boric acid in six or seven parts of water, with freshly precipitated and well-washed alumina. The solution may be used direct, or may be concentrated until the salt crystallizes out in large scales of pearly lustre. The crystals dissolve slowly but completely in water or dilute alcohol, and the solution has an acid reaction and a sweet, astringent taste. The alumina cannot be separated from the compound by the ordinary precipitants.

Bismuthol. S. Radlauer. (*Apoth. Zeitung*, 1895, 362.) The preparation introduced by the author under this name is bismuth-sodium-phosphosalicylate, and is stated to combine the antiseptic, antipyretic, and antiputrescent properties of bismuth, phosphoric acid, and salicylic acid. It is odourless and tasteless, and is applied as a dusting-powder mixed with two to four times its weight of French chalk; also in the form of ointments made with vaselin or lanolin containing 10 to 20 per cent. of the remedy, and likewise in solutions of 1 to 4 per cent. strength in the antiseptic treatment of wounds, sores, ulcerated surfaces, skin diseases, perspiring feet, gonorrhœa, etc.

Thiosapol. Drs. Eschhoff and H. Hager. (*Apotheker Zeitung*, 1894, 858.) This name has been given by Rudel to a sulphuretted soap obtained by heating olein or oleic acid with sulphur to a temperature of 120°–160° C., and saponifying the resulting sulphur compound ($C_{18}H_{34}O_2S$) with an equivalent molecular quantity of alkaline hydrate. The authors have found it a successful remedy in the treatment of skin diseases.

Liquor Anthracis. L. Finschel. (*Apotheker Zeitung*, 1895, 81.) 3 ozs. of coal-tar are dissolved in 6 ozs. (by weight) of benzene, and to this solution 6 ozs. (by weight) of rectified spirit are added. The mixture is well shaken, and kept at 35° C. for some time. A separate solution is now made by warming $1\frac{1}{2}$ oz. of potassium sulphide with $1\frac{1}{4}$ oz. of a 15 per cent. soda solution and 6 ozs. of rectified spirit, and this is added to the previous solution. The mixture is allowed to settle, and the clear liquid then decanted.

Liquor anthracis co. is obtained by proceeding as before, but adding 3 ozs. of resorcin and 5 drachms of salicylic acid to the second alcoholic solution used in the process.

Both preparations are recommended for eczema and skin diseases generally.

Parachlorophenol in Skin Diseases. (From *Chemist and Druggist*.) Parachlorophenol is a crystalline body melting at 33° C., soluble in spirit, ether, and fixed oils, and practically insoluble in water. A vaseline ointment containing 2 to 3 per cent. of this substance has been successfully used as an antiseptic and disinfectant in the treatment of erysipelas and lupus.

Application of Salicylic Acid for Ringworm. (From *Chemist and Druggist*.) Salicylic acid is highly recommended as an application for ringworm. It is used as an ointment, or better still as a saturated solution in collodion. The application is somewhat painful for a time, but is stated to be very efficient and soon to effect a cure.

Citric Acid as a Remedy for Gonorrhœa. M. Pelissier. (*Zeitschr. des oesterr. Apoth. Ver.*, July 1st, 1895, from *Wien. Med. Wochenschr.*) The author has obtained very successful results with a sterilised aqueous 1 per cent. solution of citric acid, which is injected six times daily.

Boral. (From *Chemist and Druggist*.) Boral is an aluminium borotartrate which is soluble in water. It is antiseptic and astringent, and is used as a dusting powder in skin diseases.

Cutol. (From *Chemist and Druggist*.) Cutol, or aluminium borotannate, has proved serviceable in cases of facial erysipelas. It is not soluble in water, but dissolves on the addition of tartaric acid. Such a solution has been successfully employed in acute gonorrhœa. It contains 76 per cent. of tannin, and fully 10 per cent. of boric acid.

Thymus Gland Secretion as a Hæmostatic. (*Revue de Thérapent.* From *Pharm. Journ.*) Wright finds that the following preparation of thymus gland of the calf is powerfully hæmostatic. One calf's sweetbread is cut into small pieces, and macerated for twenty-four or thirty-six hours, with frequent shaking, in the following menstruum:—Sodium carbonate, 3 to 6 parts; chloroform, 15 parts; distilled water, 300 parts; filter, and add chlorinated lime, 30 parts. Again filter, and add finally sufficient caustic soda to produce a faintly alkaline reaction. Preserve in well-stoppered bottles. Wounds are simply touched with the liquid.

Guaiacol as an External Application in Pleurisy. M. Ligalea. (*Revue de Thérapent.*, January, 1895.) The following preparation is found to give relief when applied to the thorax twice daily:—

Guaiacol	3 parts.
Glycerin	20 „
Tincture of iodine	20 „

Sulphanilic Acid, a New Remedy. (From *Chemist and Druggist*.) Sulphanilic acid, C_6H_4, NH_2, SO_3H , has been recommended by Valentin as a prompt and efficient remedy for catarrh. It is given in doses of 15 to 30 grains every four or six hours, and is best administered in the following combination:—

Acid. sulphanilic. pur	℥	.	.	.	.	5iiss.
Sodii bicarbonat. "	.	.	.	.	.	5ij.
Aq. destillat. ad	.	.	.	.	.	3vj.

M.

Dose: A tablespoonful, to be repeated in six hours.

Traumaticin. (*Bull. Gen. de Thérap.*, February, 1895. From *Pharm. Journ.*) Traumaticin is a saturated solution of gutta-percha in chloroform, which is most advantageously prepared as follows:—The lightest-coloured gutta-percha procurable is cut into small pieces and macerated with 12 or 15 times its weight of pure chloroform for twenty-four hours, with frequent agitation. The mixture is then transferred to a retort, and about one-third of the chloroform distilled off over a water-bath. The traumaticin thus obtained is a thick homogeneous liquid, to which the requisite medicament may be added. For ichthyol traumaticin 3 parts of ichthyol are added to every 10 parts—similar proportions are used for salol, lysol, and phenol. Corrosive sublimate is added in the proportion of 1 part of sublimate for 100 parts of simple traumaticin. If the simple traumaticin should be coloured, and a colourless medicament is to be added, it may be decolorised by means of animal charcoal. It is best applied with a brush of hog's bristles, and forms a thin impermeable, pliable pellicle when the chloroform dries off. It gives rise to no discomfort, except a sense of burning when first applied, due to the chloroform. Traumaticin of ichthyol is of special service in the case of erysipelas.

Preservation of Aqueous Solutions of Mercuric Chloride. E. Bureker. (*Comptes Rendus*, cxix. 340–342.) The author recommends the addition of 1·14 parts of hydrochloric acid, or of 0·5 part of tartaric acid, to a solution of 1 part of corrosive sublimate in 1,000 parts of ordinary water, either of which will prevent the injurious effect of calcium carbonate and other constituents of the water, especially if the solution be protected against free access of light and air.

Preservation of Solutions of Mercuric Chloride. L. Vignon. (*Journ. de Pharm. et de Chim.* [5], xxx. 111.) The author considers that the presence of alkaline substances in the water em-

ployed or in the glass of the bottles is the chief cause of the instability of solutions of corrosive sublimate. Organic matter present in the water also assists in the decomposition of such solutions. The decomposition may be prevented by dilute hydrochloric acid or by alkaline chlorides. Of the latter, ammonium chloride prevents decomposition by ammonia or albuminoid matter present in the water, but not that caused by alkalis or alkaline carbonates; while sodium chloride checks the injurious action of the latter. A mixture of the two chlorides is therefore considered as more efficient than either of them alone, and as equal in efficiency to hydrochloric acid. The following formulæ are recommended:—

Mercuric chloride	1 gram.
Ammonium chloride	20 grams.
Sodium chloride	10 „
Distilled water	1 litre.

OR

Mercuric chloride	1 gram.
Hydrochloric acid	1 c.c.
Distilled water	1 litre.

Disinfection of Rooms with Formaldehyde (Formic Aldehyde).

A. Trillat. (*Nouv. Rem.*, x. 464. From *Journ. Chem. Soc.*) The apparatus employed is a kind of lamp capable of transforming daily about five kilograms of methylic alcohol, by incomplete combustion, into the vapour of formal, the yield of the latter being about 25 per cent. of the alcohol consumed. The lamp consists of a copper cylinder, 20 cm. high by 16 cm. wide, which rests upon a spirit reservoir of two litres capacity, and is covered at the top by a lid. At each extremity of the cylinder there is a row of draught-holes covered by a similarly perforated movable ring, so that the entry and exit of air can be easily regulated as in a Bunsen burner. The lamp has a large round wick, about three or four centimetres above which is fixed a piece of platinum gauze. In use, the lamp is lighted, and when the platinum gauze in the cylinder has been warmed for a few seconds the draught-holes are closed. It is not long before the flame is extinguished, and if at the precise moment the draught-holes are opened wide the platinum gauze becomes incandescent. With a little manœuvring the supply of air may be so regulated that a dull red incandescence is maintained, and the lamp then continues to act, burning without a flame. The vaporised methylic alcohol is instantaneously oxidised to formic

aldehyde on coming in contact with the platinum, and the aldehyde vapour escapes through the upper draught-holes. It was found that the action of the vapour was as effectual in the upper as in the lower parts of rooms, and that in a room of 20 M³ all germs were killed by it in eight hours. In the course of further experiments it was proved that the presence of water mitigated the antiseptic action of the formal in a degree that was proportional to the humidity of the atmosphere. Surgical instruments and metallic articles, as well as cloth, etc., were not deteriorated by the action of the formal vapours, though certain colours were affected, materials dyed with rosaniline derivatives, for example, becoming somewhat violet in tint. The odour of the formal may be removed from rooms by strong currents of air, or by exposing open vessels containing ammonia.

Comparative Value of Formalin (Formaldehyde) and other Preserving Agents. R. T. Thomson. (*Chemist and Druggist*, June 1st, 1895.) For the purposes of this comparison measured quantities of the same milk, to which the various preservatives were added, were kept in stoppered bottles; the condition of each was examined from time to time, one sample of the milk free from preservative being also kept along with these for comparison. The following are the results of the observations:—

Preservative employed.	Milk after standing 6 days.	Milk after standing 7 days.	Milk after standing 8 days. Lactic acid per cent.	Milk after standing 11 days. Lactic acid per cent.
None	Sour	{ Sour, curdled }	0·68	0·71
40 p.c. formic aldehyde (8½ gr. per gall.) ...	Sweet	Sweet	0·12	0·43
40 p.c. formic aldehyde (17½ gr. per gall.) ...	Sweet	Sweet	0·10	0·14
40 p.c. formic aldehyde (35 gr. per gall.) ...	Sweet	Sweet	0·07	0·10
Boric acid (35 gr. per gall.)	{ Turned }	{ Sour, curdled }	0·42	0·52
Boric acid and borax in equivalent quantities (=35 gr. boric acid)				
Salicylic acid (35 gr. per gall.)	Sweet	Sweet	0·10	0·32
Benzoic acid (17½ gr. per gall.)	Sweet	Sweet	0·10	0·33
	{ Slightly turned. }	Sour	0·45	0·52

According to these results 1 part of formalin is as effective in preserving milk as 4 parts of boric acid (used along with borax), and the same proportion of salicylic acid, while the preserving power of benzoic acid is comparatively low. Boric acid alone appears to be much inferior to a mixture of boric acid and borax.

Pyroligneous Acid as a Disinfectant. M. Goriansky. (From *Revue d'Hygiène* and *Amer. Drugg.*) The author reports that the sputum of tuberculous patients may be efficiently disinfected by this acid, which he finds to possess the power of destroying the tubercle bacillus in a very marked degree. It is stated to be superior in this respect to other wood-tar products.

Antiseptic Dressing for Temporary Treatment of Severe Wounds. M. Branère. (*Revue de Thérapeut.*, January, 1895. From *Pharm. Journ.*) The author recommends as a dressing for embalming crushed limbs or other severe wounds, so that surgical intervention may be safely postponed, an antiseptic gauze compress saturated with the following unctuous dressing:—Salol, resorcin, and antipyrine, of each 12 parts; boric acid, 20 parts; iodoform, 1 part; vaselin, 160 parts.

Preparations of Blood-Serum as Dressings for Wounds. Dr. Schleich. (*Pharm. Journ.*, 3rd series, xxv. 582, 583.) The author describes certain dressings for aseptic wounds, and media for the application of drugs to the skin and accessible mucous surfaces. He points out that absolute asepsis is hardly attainable in any wound, and that on the cells of the incised tissue healthy repair ultimately depends. The surface of the dressing next to the wound should, therefore, not be injurious to the living cells in contact with it. With this object in view he has prepared a powder of dried and sterilised serum of ox-blood. After cleansing the surface of wound, graze, eczematous patch, or clean ulcer, this powder is dusted on, and it dries in the air to a crust. The powder for septic wounds can be obtained mixed with boric acid, iodoform, etc.

“Pasta serosa” is a paste made from the above sterile powder by incorporation with wax and zinc oxide. It has the consistence of honey, and can be readily spread with a brush over diseased surfaces, where it rapidly sets to an elastic film. The paste can be made the vehicle of drugs, such as ichthyol, chrysarobin, resorcin, lysol, etc., and is stated to mix with mercury in every proportion and also with watery solutions of sal-ammoniac. It promises to be very useful in dermatological practice.

A third preparation is introduced by the author under the name

"Pasta peptonata." This is made with Adamkiewicz's peptone, added to wax, gum, oxide of zinc, and starch. The author uses this as a means of applying gauze dressings to wounds, etc., of the scalp, neck, buttocks, etc., where bandages do not sit well. A ring of the paste is painted around the wound, and a circle of gauze is cut out and pressed on the wound and the ring of paste. The latter sets firmly in five to ten minutes. To change the dressing, the gauze is cut just inside the ring of adhesive paste, a fresh ring painted over the old one, and a new disc of gauze applied. When the wound has healed, the paste can be washed off, as it dissolves readily in water. This paste can be used mixed with iodoform, and the author claims for it an advantage over collodion in that it does not contract and crumple the skin, and that it can be used as an application to moist surfaces.

Sodium Borosalicylate, a Non-poisonous Antiseptic. M. Bernegau. (*Pharm. Journ.*, 3rd series, xxv. 434.) The author recommends a mixture of two molecular weights of sodium salicylate with four of boric acid. The finely powdered ingredients when intimately mixed with a little water yield a hard mass, which is dried and powdered, and serves as a very efficient and harmless antiseptic.

Argonin. A. Liebrecht and F. Röhmann. (*Zeitschr. des oesterr. Apoth. Ver.*, 1895, 444.) This name is given by the authors to an organic silver compound, which is recommended as an efficient antiseptic, which is especially active on species of gonococci. It is prepared by precipitating a solution of silver nitrate and casein-soda with alcohol, and is thus obtained as a white powder forming a neutral solution with water, which is not precipitated by the usual reagents for silver.

Sawdust Absorbent Dressings. A. Neve. (*Lancet*, 3739, 1052.) The author recommends the use of sawdust pads as a staple surgical dressing material. The sawdust is packed in muslin bags and the pads are readily rendered either aseptic or antiseptic. In practice they are impregnated the day before use with a 1 in 2,000 solution of mercuric zinc cyanide, or sterilised in a Cathcart's or Schimmelbusch's oven.

Soda Water as an Application for Burns. A. Gawalowski. (*Pharm. Centralh.*, from *Zeitschr. des oesterr. Apoth. Ver.*, June 10th, 1895.) The application of soda water to the burn, best by means of a syphon, is found by the author to produce a very cooling and soothing effect, quickly diminishing pain. The action is attributed to the rapid volatilisation of the carbonic acid.

Ointment for Burns. (*Zeitschr. des oesterr. Apoth. Ver.*, June 10th, 1895, from *Rev. intern. de méd.*) 3 parts of liquor ferri perchlor. are incorporated with 24 parts of paraffin ointment. This ointment, if applied soon after the accident, is stated to relieve the pain and to prevent the formation of blisters and other complications.

Liniment for Burns. (From *Pharm. Zeitung.*)

Menthol	}						aa 1 gram.
Iodoform	}						
Glycerin	.	.	.	.	.	.	100 grams.

Dandruff Pomade. (*Pharm. Zeit. and Chem. and Drugg.*)

Pilocarpine	.	.	.	.	.	.	5ss.
Quinine hydrochlorate	.	.	.	.	.	.	5j.
Precipitated sulphur	.	.	.	.	.	.	5iiss.
Peruvian balsam	.	.	.	.	.	.	3v.
Ox-bone marrow	.	.	.	.	.	.	3iij.

Mosquito Powder. (*Zeitschr. des oesterr. Apoth. Ver.*, May 20th, 1895.) The following preparation is recommended:—5 parts of eucalyptol are intimately mixed with finely powdered French chalk and 85 parts of pure starch. The resulting powder is kept in tins. When required, this powder is well rubbed into the hands and on the head several times a day.

Pasta Plumbi. Prof. Boeck. (From *Pharm. Zeitung.*)

Wheat starch	.	.	.	.	.	.	100 parts.
French chalk	.	.	.	.	.	.	100 „
Glycerin	.	.	.	.	.	.	40 „
Lead lotion	.	.	.	.	.	.	sufficient to make a soft paste.

This preparation is intended to produce the cooling effects of Goulard's lotion in a more lasting manner.

Casein as an Ointment Base. H. Unna. (*Journ. de Pharm. d'Anvers*, li. 134. From *Pharm. Journ.*) Casein is shown by the author to form a useful ointment basis. It is freed from fat by washing with alcohol and ether, then emulsified by the addition of potash or soda (3 parts to 97 of casein), so as to obtain a neutral product. A preparation consisting of 2 parts of casein and 1 part of glycerin mixes readily with 3 parts of soft paraffin, the product resembling thick condensed milk. Acids, calcium salts, and other substances which precipitate casein are of course incompatible with it. Tar and balsams should be mixed with one-fourth their weight of green soft soap before incorporating with the casein, and other substances previously brought into a semi-fluid condition

by the addition of soft paraffin and water. Such ointments are said to come more intimately in contact with the skin.

Chloroform Ointment. M. Crouzel. (*L'Union Pharm.*, March 3rd, 1895.) The following improved formula is suggested:—

Chloroform	10 parts.
Hard paraffin	5 „
Vaseline	85 „

The vaselin and paraffin are melted together, and the chloroform is gradually incorporated with the mixture after cooling. It must be carefully preserved to prevent evaporation of the chloroform.

Agar-Agar in Glycerin Suppositories. M. Lomuller. (*L'Union Pharmaceut.*, xxxvi. 197. From *Pharm. Journ.*) The author uses agar-agar (*Gelidium corneum*) instead of gelatin to make glycerin suppositories. It produces a more transparent mass, which does not stick to the mould, does not clot, and gives a more elegant article when finished. The method employed is as follows:—Take 10 parts of agar-agar in small pieces and 200 parts of water, heat until a soft paste is formed, then add with constant stirring 200 parts of glycerin.

Syrup for Painful Dentition. (*Pharm. Journ.*, from *New York Polyclinic.*) The following preparation is recommended:—

Cocaine hydrochlorate	gr. iss.
Tincture of conium	5ij.
Syrup	5ij.

It should be rubbed on the gums several times daily.

Toothache Wax. (From the *Druggists' Circular.*)

Hard paraffin	1 drachm.
Burgundy pitch	1 „
Oil of cloves	20 m.
Creosote	20 m.

Melt the first two ingredients together, add the others when nearly cold, and make the mass into pills or small cones.

Elixir Dentifrice. (From *Revue de Thérap.*)

Salicylic acid	1 gram.
Chloroform	10 grams.
Tincture of benzoin	10 „
Tincture of cannella	10 „
Alcohol	130 „

Two teaspoonfuls in a glass of water.

Tooth Paste. (From *Chemist and Druggist*.)

Pulv. pumicis	3j.
Pulv. iridis	3iv.
Pulv. saponis	3ss.
Pulv. tragacanth.	5j. gr. x.
Cretæ præcip.	3viiij.
Liq. potassæ	℥ 80.
Glycerini	3viiij.
Ol. caryophyllæ	℥ xx.
Otto rosæ	℥ xv.
Ol. rosæ geranii	℥ xv.

Depilatory Collodion. (*Journ. de Pharm.*, May 1st, 1895.) The following preparation is recommended:—

Iodine	12 grains.
Oil of turpentine	20 drops.
Castor oil	$\frac{1}{2}$ drachm.
Alcohol	2 $\frac{1}{2}$ drachms.
Collodion	1 ounce.

One application is made daily and is repeated for four days, after which the film is removed, and the surface beneath will now be found free from hair.

Removal of Birth-Marks. M. Brault. (From *B. J. Derm.*) For this purpose a sterilised concentrated solution of chloride of zinc is suggested, which is carefully painted on the marks and allowed to remain on for about a week or ten days, after which the crust which soon begins to form will scale off.

Fumigating Paper and Powder. (From *Pharmaceutische Central-halle*.) Pieces of paper or pine-wood sawdust are macerated in the tincture, which is prepared as follows:—

Benzoin, in small pieces	50 parts.
Tolu balsam	50 „
Styrax	10 „
Alcohol	300 „

Filter, and dissolve in the filtrate.

Peru balsam	10 parts.
Oil of cinnamon	1 part.
Oil of lavender	1 „

Fruit Syrups. (*Pharm. Journ.*, 3rd series, xxv. 29, from *Western Druggist*.) The different formulæ here given have been collected from various sources. The “Appert” process mentioned consists

of the usual mode of sterilising. The bottles are filled, allowing enough space for expansion of the contents when hot, the corks are inserted and securely fastened with twine. They are then placed into a vessel with cold water reaching up to their necks, standing on a false bottom or a layer of straw. The temperature of the water-bath is gradually raised, and finally the boiling point maintained for 10–15 minutes. Removing from the bath, the tops are sealed over and the bottles allowed to cool in a reclining position. Some prefer to insert the corks only after sterilisation is complete. This involves less danger of explosions, but is rather less reliable.

Syrup of Raspberry.—Contuse the berries, place them in a vat, add 2 per cent. of sugar, and ferment the mass at a temperature of between 70° and 80° F. for three or four days until all pectin has separated and no more signs of fermentation are visible. Then express the juice, which allow to settle in a cool place for two days, decant carefully from the pulverulent pectin, and filter. Preserve the juice by Appert's process, or convert into syrup by dissolving in 5 parts of the clarified juice 9 parts of sugar, and heating to the boiling point.

2. A better and safer way is to add at once to the freshly bruised fruit 5 to 6 per cent. of alcohol, and then to proceed as before. This process would seem to deserve preference.

3. Crush the raspberries in a glass vessel with a wooden pestle to a pulp, add to it 5 to 10 per cent. of cane or grape sugar, and allow the whole to stand, stirring occasionally. When the mass ferments the juice becomes clear, when it may be filtered and bottled, or converted into syrup.

4. Put six pounds of raspberries into a china bowl, with a quart of water, in which has been dissolved $2\frac{1}{2}$ ounces of citric acid, and let it remain for twenty-four hours; then strain, taking care not to bruise the fruit. To each pint of clear liquid add $1\frac{1}{2}$ pounds of sugar, and stir until it is dissolved.

5. Proceed as in No 1. When the fermentation is nearly ended, express the juice, add to every pound of the latter 1 ounce of deodorised alcohol, set aside for one night, and then filter. Bottle the juice or convert into syrup.

6. Macerate the berries interspersed with sugar, $1\frac{3}{4}$ pound of sugar to 1 pound of berries, for twenty-four hours in a cool cellar, and then drain off the juice. Preserve the syrup by means of Appert's process.

7. Add to the foregoing product some alcohol, or a little bisul-

phite of lime. The flavour is not supposed to be impaired by the latter.

8. Pure fruit juice, 16 fluid ounces; dilute acetic acid, 1 fluid ounce; water, 7 fluid ounces; granulated sugar, 3 pounds. Dissolve the sugar without heat. Preserve in air-tight vessels in a cool place.

Syrup of Mulberry.—Mulberry juice, 1 pint imp.; sugar, 2 lbs.; strong alcohol, $2\frac{1}{2}$ fluid ounces. Heat the juice to the boiling point, and when it has cooled filter it. Dissolve the sugar in the filtered liquid with a gentle heat, and add the spirit.

Syrup of Strawberry.—Put 2 parts of strawberries, deprived of the calyx, without crushing them, into a large-mouthed jar; add to them $2\frac{1}{2}$ parts of sugar, and frequently shake, keeping the vessel in a cool place. The sugar absorbs the juice, leaving the fruit shrivelled and tasteless, the latter being removed by means of a strainer without pressure. Mix the clear syrup with 20 per cent. of alcohol.

Syrup of Cherry.—Employ the black, sour variety. Crush the cherries, together with the stones, and follow the directions given in No. 2.

Fruit Syrup for Lemonade.—Raspberries, 1,000 grams; blackberries, 500 grams; bilberries, 500 grams; lemons, 3 fruits. Mash in a stone mortar, and add 1,500 grams of cold water. Allow to stand for three days, or until fermentation has finished. Express and filter. In every 2,500 dissolve citric acid, 40; and sugar, 4,500 grams. Boil up once in a copper kettle.

Flavouring Syrups. M. Galen, jun. (From *American Druggist and Pharm. Rec.*)

Syrup of Vanilla.

Vanilla essence	fl. ʒ iv.
Solution of caramel	fl. ʒ ij.
Syrup containing gelatin	ʒ iv.—Cong. j. O. ij.

Mix well.

Orange Syrup.—Grate the outer peels of six large oranges, and rub the gratings with 8 ounces of loaf sugar. To this add half a gallon of syrup, stir thoroughly until the sugar is dissolved, and strain. Add the expressed juice of the oranges and 1 fluid ounce of a 50 per cent. solution of citric acid to the strained solution, and, lastly, add sufficient syrup to bring the bulk up to 1 gallon.

Lemon Syrup.—Take two large, sound lemons; grate the peel, and triturate with 2 ounces of sugar of milk, and 1 pint of hot

simple syrup. Shake thoroughly, and when cold, add the expressed juice of the lemons, $\frac{1}{2}$ ounce of solution of citric acid (50 per cent.), and sufficient syrup to bring the total bulk up to 1 gallon.

Chocolate Syrup.

1.

Powdered chocolate	. . . . .	3 iv.
Powdered cocoa	. . . . .	3 ij.
Cold water	. . . . .	3 xj.
Simple syrup	. . . . .	Cong. j.

Mix the chocolate powders and make into a thin paste with the water. Heat the syrup to the boiling point, and add the thin paste to it gradually, stirring vigorously. Use without straining.

Chocolate Syrup.

2.

Powdered chocolate	. . . . .	3 viij.
Water	. . . . .	Oj.
Vanilla essence	. . . . .	fl. 3ij.
Simple syrup	. . . . .	Cong. j.

Triturate the chocolate with sufficient hot water to form a smooth paste; then add the syrup and heat to the boiling point. When cool, strain through cheesecloth, and add the vanilla essence.

Cream Chocolate.

Chocolate	. . . . .	3 viij.
Condensed milk	. . . . .	1 can.
Loaf sugar	. . . . .	3 lxxx.
Vanilla essence	. . . . .	fl. 3iss.
Whites of egg	. . . . .	No. ij.

Triturate the chocolate with sufficient water to form a paste, and add this to the remainder of the water in which the other ingredients have been dissolved.

Coffee Syrup.

Mocha and Java coffee, of each	3 viij.
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Put the mixed coffees in a percolator, and add:—

Boiling water	Ovj.
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Allow the coffee to macerate about twelve hours before starting percolation; then percolate to 5 pints.

For hot soda add:—

Sugar	3 lxxx.
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For cold soda :—

Sugar	3cxxviiij.
Condensed milk	3xvj.
Caramel solution	q.s.

Essence for Mulled Wine. (From *Drogisten Zeitung* and *Chemist and Druggist*.)

Tincture of orange	50 drops.
Oil of lemon	10 „
Oil of cloves	2 „
Oil of cinnamon	2 „
Rectified spirit	3 ozs.
Water	1½ oz.

Mix.

A dessertspoonful of this is added to a bottle of wine sufficiently sweetened.

Acid-Proof Cement. (From *Amer. Drugg. and Pharm. Rec.*) The following preparation is recommended for cementing glass, porcelain, or other vessels intended to hold corrosive acids :—

Asbestos	2 parts.
Barium sulphate	3 „
Sodium silicate	2 „

By mixing these ingredients a cement strong enough to resist the strongest nitric acid will be obtained. If hot acids are dealt with, the following mixture will be found to possess still more resistant powers :—

Sodium silicate	2 parts.
Fine sand	1 part.
Asbestos powder	1 „

Both these cements take a few hours to set. If the cement is wanted to set at once, use potassium silicate instead of sodium silicate. This mixture will be instantly effective, and possesses the same power of resistance as the other.

Russet Leather Shoe Dressing. (From *Amer. Drugg. and Pharm. Rec.*)

1.

Yellow wax	3v.
Potassium carbonate	3ij.
Yellow soap	5ij.
Turpentine	3ij.
Water	3xij.
Aniline brown or annatto	q.s.

2.

Palm oil	16 parts.
Common soap	48 „
Oleic acid	32 „
Glycerin	10 „
Tannic acid	1 part.

Melt the soap and palm oil together with a very gentle heat. When the soap is dissolved, add the oleic acid. Dissolve the tannin in the glycerin; add this to the hot mixture, and stir until cold.

3.

Soft soap	4 drams.
Linseed oil	6 „
Annatto solution (in oil)	2 ounces.
Beeswax	6 drams.
Turpentine	2 ounces.
Water	2 „

Dissolve the soap in the water, and add the annatto. Melt the wax in the oil and turpentine; then gradually stir in the soap solution. Keep stirred until cold.

4.

Yellow wax	4 ounces.
Pearl ash	$\frac{1}{2}$ ounce.
Yellow soap	$\frac{1}{4}$ „
Water	12 ounces.

Scrape the wax and boil with these ingredients until a perfectly uniform cream is obtained, then remove from the fire and add:—

Turpentine	8 ounces.
Phosphine (aniline)	4 grains.
(Dissolved in $\frac{1}{2}$ ounce alcohol.)	

Shake until thoroughly combined, and make up to 24 ounces with water.

Veterinary Counter Remedies. A. W. Hoare. (*Manual of Vet. Therap. and Pharmacol.*, 1895. From *Chemist and Druggist.*)

Cough Powders.

Useful in the simple coughs of horses depending on catarrh:—

Pulv. camphoræ	5ij.
Potass. chlorat.	ʒiiss.
Pulv. fol. belladonnæ	ʒiiss.
Pulv. anisi	ʒij.

Div. in pulv. vj.

Give one twice a day in the food.

For chronic cough in the horse the following is recommended:—

Pulv. fol. aconiti	. . . . .	5vj.
Pulv. digitalis	. . . . .	5iv.
Arsenic. alb.	. . . . .	gr. iv.
Pulv. anisi	. . . . .	3ss.

Div. in pulv. vj.

Give one every night in the food.

Cough Mixture for Dogs.

Tr. belladonnæ	. . . . .	3ss.
Syr. scillæ	. . . . .	3ss.
Tr. camph. co.	. . . . .	3j.
Aq. ad	. . . . .	3vj.

M.

Give one teaspoonful three times a day.

Colic Draughts for Horses.

For Simple Colic.

Chlorodyni	. . . . .	3j.
Spt. æther. nit.	. . . . .	3ij.
Ol. lini.	. . . . .	0j.

M.

Give at one dose, and repeat in two hours if necessary.

For Flatulent Colic.

Creolin	. . . . .	3ss.
Ol. terebinth.	. . . . .	3ij.
Spt. ammon. arom.	. . . . .	3ij.
Tr. asafœtidæ	. . . . .	5ij.
Ol. lini.	. . . . .	Oiss.

M.

For one dose.

Draught for Hoven in Cattle.

Creolin	. . . . .	3j.
Ol. terebinth.	. . . . .	5iv.
Spt. ammon. arom.	. . . . .	5iv.
Ol. lini.	. . . . .	Oiss.

M.

For one dose.

Influenza in Horses.

Chlorodyni	. . . . .	3j.
Spt. æther. nit.	. . . . .	3ij.
Liq. ammon. acet.	. . . . .	3ij.
Aq. ad	. . . . .	3xv.

M.

This dose is to be given every three hours during the first stage, when much shivering is evident.

Throat Liniment.

Ol. terebinth.	. . . . .	3j.
Liq. ammon. fort.	. . . . .	3j.
Ol. olivæ	. . . . .	3j.

M.

Stimulating White Liniment.

Ol. terebinth.	. . . . .	3xvj.
Camphoræ	. . . . .	3j.
Saponis mollis	. . . . .	3ij.
Aq. destil.	. . . . .	3ij. vel. q.s.

Mix the soap with the water; dissolve the camphor in the turpentine; mix the two, and reduce to the desired consistence by the addition of water.

Ointment for Cracked Heels.

Sulphur. subl.	. . . . .	3j.
Plumbi acetat.	. . . . .	3ss.
Creolin	. . . . .	3ss.
Ol. eucalypti	. . . . .	3ss.
Vaselini	. . . . .	3iv.
Lanolini	. . . . .	3iv.

M. Ft. ung.

Apply twice daily.

Fly Blister.

Pulv. cantharidis	. . . . .	3xx.
Ol. terebinth.	. . . . .	3xij.
Acid. acet. fort.	. . . . .	3ix.
Lanolini	. . . . .	lb. iiss.
Vaselini	. . . . .	lb. iiss.

Mix the first three, and allow to stand for twenty-four hours; then add the lanolin and vaselin, melted on a water-bath, and mix well, stirring until cold.

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OF THE
British Pharmaceutical Conference
AT THE
THIRTY-SECOND ANNUAL MEETING
AT
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ALPHABETICAL LIST OF MEMBERS' NAMES AND ADDRESSES.

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2. To determine what questions in Pharmaceutical Science require investigation, and when practicable, to allot them to individuals or committees to report thereon.
3. To maintain uncompromisingly the principle of purity in Medicine.
4. To form a bond of union amongst the various associations established for the advancement of Pharmacy, by receiving from them delegates to the annual Conference.

Art. II.—Membership in the Conference shall not be considered as conferring any guarantee of professional competency.

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Mr. A. Strachan, 138, Rosemount Place, Aberdeen.
- BIRMINGHAM.**—Midland Pharmaceutical Association. Mr. Geo. E. Perry, Edgbaston, Birmingham.
- BOURNEMOUTH.**—Chemists' Association.
- BRIGHTON.**—Association of Pharmacy (1861). School of Science and Art, Brighton.
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- COLCHESTER.**—Association of Chemists and Druggists (1845). Mr. J. C. Shennstone, 13, High Street, Colchester.
- DOVER.**—Chemists' Association. Mr. R. M. Ewell, 37, Town Wall Street, Dover.
- DUNDEE.**—Chemists and Druggists' Association (1868). Mr. J. Russell, 111, Nethergate, Dundee.
- EDINBURGH.**—Chemists' Assistants' Association. Mr. E. J. Dey, 36, York Place.
- GLASGOW AND WEST OF SCOTLAND.**—Pharmaceutical Association. Mr. Alexr. Laing, 211, Great Western Road.
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- LIVERPOOL.**—Chemists' Association (1849). Mr. Anthony S. Buck, Royal Institution, Liverpool.
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- MANCHESTER.**—Pharmaceutical Association. Mr. A. Blackburn, 7, Exchange Street.
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- OLDHAM.**—Chemists' and Druggists' Assistants and Apprentices' Association (1870). Mr. C. G. Wood, Secretary, Church Institute, Oldham.
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Journals.

American Druggist; American Journal of Pharmacy; Archiv der Pharmacie; British and Colonial Druggist; British Medical Journal; Canadian Pharmaceutical Journal; Chemical News; Chemist and Druggist; Journal de Pharmacie et de Chimie; Lancet; Medical Press and Circular; The National Druggist; Pharmaceutisches Journal; Pharmaceutische Centralhalle; Répertoire de Pharmacie.

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OF THE

BRITISH PHARMACEUTICAL CONFERENCE

AT THE

THIRTY-SECOND ANNUAL MEETING, BOURNEMOUTH, 1895.

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 HOLMES, E. M., F.L.S., London.
 MATTHEWS, H., Oxford.
 WELLS, W. F., Dublin.

WRIGHT, R., F.C.S., Buxton.

Auditors.

C. CLAYTON, Oxford, and F. SPINNEY, Bournemouth.

Assistant Secretary.

J. C. NIGHTINGALE.

Editor of Year-Book.

LOUIS SIEBOLD, F.I.C., F.C.S.

Local Committee.

AMOORE, H., Bournemouth.
 BEALE, J. H. T., Bournemouth.
 BILSON, F. E. (*Treasurer*),
 Bournemouth.
 BOOTHAM, W. B., Bournemouth.
 BRIDGE, G. E. (*Chairman*),
 Bournemouth.
 CONROY, A. J., Boscombe.
 DOBLE, A. G., Wimborne.
 ENDLE, F., Bournemouth.
 FARADAY, G., Bournemouth.
 GORDELLER, J. H., Boscombe.

GREEN, J., Christchurch.
 HALL, J. T., Bournemouth.
 HARDWICK, S. (*Secretary*),
 Bournemouth.
 HUNTLEY, G. F., Wimborne.
 HAYNES, J. A., Bournemouth.
 HOBBS, A. E., Bournemouth.
 JARVIS, A., Parkstone.
 JONES, W., Bournemouth.
 LAWRENCE, A. F., Bournemouth.
 MOYLE, S. B., West Bourne-
 mouth.

POMEROY, F. T., Poole.
 RAYSON, H., Ringwood.
 RYE, F., West Bournemouth.
 SEYMOUR, F. S., Wimborne.
 SPINNEY, F., Bournemouth.
 TAYLOR, G., West Bournemouth.
 TOONE, J. A., Bournemouth.
 VICENT, J., Bournemouth.
 WILLIAMS, J. H., Bournemouth.
 WORTH, E., Bournemouth.
 YATES, S. P., Boscombe.

THE SITTINGS OF THE CONFERENCE WERE HELD IN THE

SHAFTESBURY HALL, BOURNEMOUTH,

ON TUESDAY & WEDNESDAY, JULY 30 AND 31, 1895,

Commencing at Ten a.m. each day.

MONDAY, 29th JULY.

The EXECUTIVE COMMITTEE met according to notices from the Honorary General Secretaries, at 6 p.m., at the Hotel Mont Dore, Bournemouth.

TUESDAY, 30th JULY.

The CONFERENCE met at 10 a.m., adjourning at 1 p.m.; and at 2 p.m., adjourning at 4 p.m.

Order of Business.

Address of Welcome by His Worship the Mayor of Bournemouth.

President's Address.

Reception of Delegates.

Report of Executive Committee.

Financial Statement.

Report of Treasurer of the "Bell and Hills' Library Fund."

Report of Unofficial Formulary Committee, by W. Martindale, F.C.S.

Reading of Papers and Discussions thereon.

PAPERS.

1. *Report on Sandal Wood Oil.* By E. J. PARRY, B.Sc.
2. *Notes on Ipecacuanha.* By R. A. CRIPPS, F.I.C.
3. *Report on the Strength of Commercial Samples of the Tinctures of the British Pharmacopœia.* By E. H. FARR and R. WRIGHT, F.C.S.
4. *Cod Liver Oil Constants.* By E. J. PARRY, B.Sc., and C. E. SAGE, Ph.C.
5. *Oil of Scotch Fir and other Pine Oils.* By J. C. UMNEY, F.C.S.
6. *The Still Alarm.* By N. CROSSLEY JONES and P. W. JONES.
7. *Sterilised Surgical Dressings: a Record of Experience.* By EDMUND WHITE, B.Sc.

There was a mid-day adjournment between 1 and 2 p.m. for luncheon at the Hotel Mont Dore.

In the afternoon, after the adjournment of the Conference sittings, there was an excursion to Swanage by the Steam Ship *Lord Elgin*. The picturesque scenery along the coast was greatly admired. After disembarking, the famous Globe in the Isle of Purbeck, the Tilly Whim rocks and the well-known caves were visited by most of the passengers. Afternoon tea was served on board, and the weather was all that could be desired, the return journey being made on the Steam Ship *Empress*.

WEDNESDAY, 31st JULY.

The CONFERENCE met at 10 a.m., adjourning from 1 till 2 p.m. The whole of the business of the Conference was completed this day about 4.30 p.m.

Order of Business.

Reception of Delegates.

Reading of Papers and Discussions thereon.

PAPERS.

8. *The Weights and Measures of the British Pharmacopæia, versus the Metric System.* By W. ELBORNE, B.A., F.L.S.
9. *The Volumetric Solutions of the British Pharmacopæia.* By W. ELBORNE, B.A., F.L.S.
10. *Remarks on the British Pharmacopæia with reference to securing the more general use of the Work and recognition of an Imperial character.* By C. SYMES, Ph.D.
11. *The Recovery of Alcohol from Tincture Marcs.* By F. C. J. BIRD.
12. *Syrup. Hypophos. Co. B.P.C.* By W. A. H. NAYLOR, F.I.C.
13. *Note on a Sample of a Spurious Balsam of Tolu.* By J. O. BRAITHWAITE.
14. *Quality of Commercial Samples of Powdered Ipecacuanha.* By PROFESSOR GREENISH.
15. *Acetic Extract of Ipecacuanha.* By F. C. J. BIRD.
16. *Note on Tincture of Lobelia.* By J. F. LIVERSEEGE, F.I.C.
17. *Glycerine Tincture of Cinchona.* By FREDERICK DAVIS, B.Sc.

Presentation from "Bell and Hills' Fund."

Election of Formulary Committee.

Place of Meeting for 1896.

Election of Officers for 1895-6.

There was a mid-day adjournment between 1 and 2 p.m. for luncheon at the Hotel Mont Dore.

THURSDAY, 1st AUGUST.

EXCURSION to the New Forest. Coaches left the Sanatorium Road in the front of the Hotel Mont Dore, at 9.30 a.m. For particulars, see page 419,

BRITISH PHARMACEUTICAL CONFERENCE.

MEETING AT BOURNEMOUTH, 1895.

THE Thirty-second Annual Meeting of the British Pharmaceutical Conference commenced its sittings on Tuesday, July 30th, in the Shaftesbury Hall, Bournemouth, N. H. Martin, Esq., F.L.S., F.R.M.S., in the chair.

The following members and friends were present during the meeting :—

Bath—Masters, H. J.; Masters, Mrs.; Partington, J. J.

Birmingham—Alcock, F. H.; Gibbs, R. D.

Boscombe—Tame, Thomas.

Boston—Smithson, John.

Bournemouth—Amoore, J. S. S.; Bilson, F. E.; Bootham, W. Bland; Bridge, George E.; Conroy, A. J.; Cormack, Dr. J. C.; Endle, Frederick; Hardwick, Stewart; Hobbs, A. E.; Jones, Wm.; Lawrence, Arthur F.; Love, A. E. B.; Spinney, F.; Spinney, W. F.; Toone, J. A.; Williams, J. H.

Bradford—Silson, Miss; Silson, Miss Jeannie; Silson, Miss Sarah; Silson, R. T.; Silson, R. W.

Bridgewater—Basker, J. A.

Brighton—Gibson, Horace; Gibson, W. H.; Smithson, A.

Bristol—Schacht, G. F.

Cheltenham—Barron, W.

Chester—Shepherd, Thomas.

Chiswick—Strother, C. J.

Clifton—Buxton, Thomas; Toppin, J. Morris.

Coleraine—Baxter, W. J.

Conway—Williams, W. G.

Coventry—Hinds, James.

Dalkley (Dublin)—Beggs, G. D.

Droitwich—Harris, Stephen.

Edinburgh—Ewing, J. Laidlaw.

Exeter—Gadd, J. W.; Lake, J. Hinton; Townsend, Wm.

Exmouth—Toone, A. H.; Toone, E. J.

Grantham—Hardwick, G. H.

Hitchin—Ransom, F.; Ransom, Mrs.

Leamington—Hutton, H.

Leicester—Clark, J. W.

Liverpool—Conroy, M.; Cowley, R. C.; Smith, J.; Symes, C.; Symes, F. G.; Wardleworth, Theo. H.

London—Arkinstall, W.; Bird, F. C. J.; Bird, Miss; Bremridge, Louisa; Bremridge, R.; Bryan, A.; Carteighe, M.; Carteighe, Mary; Collier, H.; Dyson, W. B.; Dyson, Mrs.; Elborne, Wm.; Everson, H. P.; Guyer, R. Glode; Howard, D. Lloyd; Humphrey, J.; Jones, H. C.; Lucas, E. W.; Lucas, Mrs.; MacEwan, Peter; Martindale, Wm.; Mathews, J. H.; Moss, John; Naylor, W. A. H.; Nightingale, J. C.; Parry, E. J.; Pettinger, Elmer; Robinson, W. P.; Rowe, E. S. S.; Rowe, F. A.; Sangster, A.; Snaddell, M.; Stevens, P. A.; Taubman, R.; Taylor, G. S.; Umney, J. C.; Umney, Mrs.; Want, W. P.; Warren, W.; Weston, S. T.; Whigham, R. L.; Wink, J. A.; Wright, T. R.

Manchester—Johnstone, C. A.; Kemp, H.; Pidd, A. J.; Wheel-
don, J.

Merthyr Tydvil—Harris, E. W.

Oxford—Druce, G. C.; Mathews, Henry.

Paisley—Fraser, Alexander.

Plymouth—Park, Charles.

Poole—Groves, T. B.

Putney—White, Edmund.

Redcliffe—Smith, J. T.

Salisbury—Atkins, S. R.

Settle—Shepherd, W. J.

Sevenoaks—Holmes, E. M.; Holmes, Kate.

Southampton—Chipperfield, Robert; Wilson, H.

Swansea—Hughes, James.

Uckfield—Farr, E. H.

Vienna—Roder, Dr. L.

Wareham—Randall, W. J.; Smith, A.

Wellington (Salop)—Bates, J.

Wigan—Johnson, T.

Wimborne—Sogmond, Fred. S.

York—Grierson, G. A.

MEETING OF THE EXECUTIVE COMMITTEE.

A meeting of the Executive Committee was held at the Hotel Mont Dore, Bournemouth, on Monday, July 29th, at 6 p.m.

Present:—Mr. N. H. Martin (President); Messrs. Atkins, Carteighe, Groves, Schacht, Ewing, and Toone (Vice-Presidents); Mr. Moss (Treasurer); Messrs. Bird, Bridge, Druce, Farr, and Mathews; Mr. Stewart Hardwick (Hon. Local Secretary); Messrs. Naylor and Ransom (Hon. Gen. Secretaries); and Mr. J. C. Nightingale (Asst. Secretary).

The minutes of the previous meeting were read and confirmed.

The Treasurer's financial statement of the year ending July 30th, 1895, was read and approved.

A draft report for presentation to the annual meeting was submitted by the Hon. Gen. Secretaries, and agreed to.

A proposed list of officers for the ensuing year was adopted for recommendation to the general meeting for election. It was decided that a list of these names should be printed and handed to each member at the annual meeting.

The draft programme for the proceedings of the sittings of the Conference was laid on the table and approved.

The place of meeting for 1896 was considered, and it was announced that a deputation would be present from Liverpool, who would offer a cordial invitation to the Conference to meet in that city.¹

The following eighty-seven gentlemen having been duly nominated were elected to membership:—

Bailey, J. H., Plymouth.
 Ball, H., Southport.
 Barlow, A. B., Manchester.
 Bell, W. M., London.
 Bennett, F. B., Whitehaven.
 Bergheim, Mr., London.
 Betts, Geo., Norwich.
 Blunt, W. H., Birmingham.
 Blyth, Utton, Sutton.
 Botham, W. B., Bournemouth.
 Brooke, J., Manchester.
 Broughton, T., Manchester.
 Burbank, Mr., Oxford.
 Butcher, G. S., Salford.

Buxton, T., Bath.
 Carmichael, M., Glasgow.
 Christey, C., London.
 Clear, H. W., Northampton.
 Cocks, I., Stonehouse.
 Conroy, A. J., Boscombe.
 Cooke, W. A., Newport Pagnell.
 Coste, J. H., London.
 Cowley, R. C., Liverpool.
 Crook, Geo., Southport.
 Davidson, P., London.
 Delf, F. D., Dewsbury.
 Evans, E. N., Liverpool.
 Ewing, J. & Co., Dumfries.

- Fleet, J. T., Rugby.
Fletcher, Wm., Ilkeston.
Frankland, Prof. P., Birmingham.
Franklin, A. J., Brighton.
Fuerst, J., London.
Gavin, Thos., Manchester.
Gibson, Prof. John, Edinburgh.
Gifford, R. L., Blackburn.
Griffiths, W., Cirencester.
Grimwood, R., London.
Halliday, S., Cleckheaton.
Hill, J. S., Warrington.
Holt, H. C., Manchester.
Howard, A. G., Stratford.
Hughes, J. W., Manchester.
Hugill, J. H., London.
Jackson, A., Manchester.
Jeans, T. R., Manchester.
Kemp, C. T., Romsey.
Lambert, A., London.
Lambie, H., Glasgow.
Lauder, A., Newcastle-on-Tyne.
Law, W. T., Glasgow.
Lawrence, A. F., Bournemouth.
Lewis, D. J., Cardiff.
Lowe, Chas., Reddish.
McCombie, C. F., Leyton.
March, A. E., Newcastle-on-Tyne.
Middleton, D., Edinburgh.
Miller, J. W., Glasgow.
Moxon, G. R., London.
Parry, F. G., Newcastle-on-Tyne.
Pickering, W. C., Northampton.
Pomeroy, F. T., Poole.
Prior, J. S., Melton Mowbray.
Rainer, C. O., Demerara.
Richardson, W. A., London.
Riding, J., Manchester.
Robinson, Geo., Glasgow.
Robson, T. J., Newcastle-on-Tyne.
Roder, Dr. L., Vienna.
Russell, J. A., Glasgow.
Shacklady, J., Liverpool.
Sillis, H., London.
Smithson, J., Brighton.
Stephens, F. R., Clevedon.
Stevenson, H. E., London.
Sturton, J. G., Peterboro'.
Sudlow, R. C., London.
Thomas, L., Johannesburg.
Townsend, W., Exeter.
Tupman, H. W., Worthing.
Tyson, J., Manchester.
Walker, J., Liverpool.
Wardleworth, T. H., Liverpool.
Wathes, A., Birmingham.
Wellburn, J. S., London.
Williams, J. H., Bournemouth.
Wokes, T. S., Liverpool.

GENERAL MEETING.

Tuesday, July 31st.

The business of the Pharmaceutical Conference commenced on Tuesday morning, at 10 o'clock, in the Shaftesbury Hall, when the chair was taken by the President, Mr. N. H. Martin, of Newcastle-on-Tyne. He opened the proceedings by expressing his regret that the Mayor of Bournemouth was unfortunately unable to be present, but the Deputy-Mayor, Alderman Newlyn, had been kind enough to come in order to give a welcome to the Conference.

Mr. ALDERMAN NEWLYN, in the name of the Corporation and town of Bournemouth, offered a cordial welcome to the Conference. He said he had no doubt that the name of Bournemouth was known to all, as its fame had spread almost throughout the universe, and amongst sanatoria it stood second to none; but such visits as the present of gentlemen held in such honour by the medical profession must tend to increase the fair fame of the town. It had been the endeavour of the governing body to assist nature in laying out the town to the best advantage, taking into their confidence and obtaining the aid of those most capable of judging of such matters. He need scarcely allude to more than one circumstance which would enforce what he had said, and that was that Bournemouth was recognised as the sanatorium of England. He concluded by expressing the hope that their visitors would go away with very pleasant memories of their visit.

Dr. Lys said he had great pleasure in adding a word of welcome on behalf of the medical profession of Bournemouth. Medical men there, as everywhere, recognised fully the great aid which pharmacy had rendered in the past, and was still rendering to the art of medicine. Even the most conservative must recognise the value of some of the British Pharmaceutical Conference formulae, and at a time when the revision of the British Pharmacopœia was imminent, and when it was being discussed in all medical circles, he might well offer a welcome to such a gathering as the present. It was a happy omen that the Conference met in a town where pharmacy held so high a position. Bournemouth stood very high in respect to the separation of medicine and pharmacy, which in that neighbourhood was almost complete. Personally he looked back on his experience of dispensing with pleasure and interest, but he recognised the value of strictly pharmaceutical work, and

concluded by wishing the Conference a pleasant and successful meeting.

The PRESIDENT, in the name of the Conference and his own, tendered his thanks to Alderman Newlyn and Dr. Lys for their kind welcome. It was quite true that the name of Bournemouth had been known far and wide for many years. The imagination of those who lived in such a place as Newcastle could scarcely conjure up the picture of such a beautiful place, and for the first day or two of one's visit one could hardly restrain some natural feelings of envy for those who were privileged to live there, but he hoped better feelings would prevail, and that after spending a week there they would all go away with the idea that after all life was worth living, if only one could live in Bournemouth. The Corporation of the town was to be congratulated very much on the excellent taste with which it had laid out the beautiful country, and made such use of the many natural advantages, which were not to be found elsewhere. Every street and almost every house was a thing of beauty. It was very gratifying to be welcomed by a representative of the medical profession. As Dr. Lys had said, medicine and pharmacy were so intimately connected that they were really dependent upon one another. He was glad that the work of the British Pharmaceutical Conference Formulary Committee had been recognised. Before that Committee set to work there was often a difficulty with regard to formulæ for the new drugs which came into the market from time to time, and which medicine required to use, but which sometimes suffered from diversity of formulæ. In the case of strophanthus, a good tincture had been devised by the Committee, and to its general use he believed a good deal of the reputation of that useful drug was due. He concluded by again thanking Alderman Newlyn and Dr. Lys for their kind words of welcome.

The PRESIDENT then delivered his address.

THE PRESIDENT'S ADDRESS.

My first duty is to congratulate the members of the Conference upon the happy auspices under which we meet this year. We have the privilege of assembling in a town where medicine and pharmacy are conducted upon the ideal basis of prescribing being confined to those who have been specially trained and qualified for

the duty, and dispensing being left in the hands of those who have been specifically and equally well trained for its performance. I have no doubt but that we shall find this to be entirely satisfactory, and that a week of contact with our pharmaceutical brethren in Bournemouth will increase our respect for, and strengthen our faith in, pharmacy and its future. I also congratulate the Conference very sincerely upon the unique character which marks the invitation to come to this town. For reasons which are well known to all of us, the Conference has, with two exceptions, always been invited, and has accepted the invitation to visit the same town as the British Association. There are advantages connected with such a custom; and I, for one, hope the Conference will receive and accept many such invitations in the future. It is an open secret, however, that the pharmacists of Bournemouth have been impatient at the delay of their neighbours to invite the British Association, and that they have for some years past been desirous to welcome the Conference for its own sake. I am told that all the pharmacists of Bournemouth are members of the local committee, and the programme which is in our hands bears witness that everything which is possible has been done to render our meeting a brilliant success. The Conference will owe a debt of gratitude to Bournemouth which we hope pharmacy will continue to repay to our local *confrères* long after all traces beyond the pleasant memories of this meeting shall have passed away.

THE DIGNITY OF PHARMACY.

Now I come to the serious duty which devolves upon me as the outcome of having accepted for the second time the honour which you have conferred upon me in this Presidency. The burden of my address is pharmacy, and if in reference to its past or present condition I make any remarks which are even remotely capable of a personal application, I beg you, and any who may read or criticise this address, to accept my assurances that I feel deeply the responsibility of what I am compelled to say, that my references are to facts and principles and not to persons, and if you have any love for pharmacy, I hope you will ponder over whatever may be true and helpful in any suggestions that I may make. At the present moment we are bound to acknowledge that true pharmacy in this country is in a most unsatisfactory condition. It is between a false assumption and pretence of science and the whirlwind of modern trade, and the practice of pharmacy as a separate calling is in danger of being lost altogether. By

many of those who should be the leaders and defenders of pharmacy the word "pharmaceutical" is often flouted and sneered at, and treated as an adjective which no man in advance of the middle ages would dream for one moment of applying to anything scientific. Some of these men openly say that they do not know such a thing as "pharmaceutical" chemistry, and that there is no such thing as "materia medica," chemistry and botany having eviscerated that subject long ago. Such remarks are caught up by men who never in their lives spent a thoughtful hour in the pursuit of true science, and it comes to be considered the acme of wisdom to sneer at the science which is practical in the fulfilment of an essential duty. I believe pharmacy to be an entity which is useful in a civilized state of society, the duties and landmarks of which are as capable of definition as medicine, biology, physiology, and many other well-recognised divisions of knowledge. I am aware that it has no claim to stand alone as an abstract science, but must depend on botany and chemistry for the elucidation of many of its problems; but in this respect, is it not on a par with the other divisions I have mentioned? Medicine, of course, is dependent on even a larger number of the various branches of science than pharmacy; but have biology or physiology any claims to be considered as abstract sciences? Are not their very names indicative of the want of knowledge of those who study them; and how dare any man say that a biological investigation is science, and worthy of all the honour which societies can bestow, while a pharmaceutical investigation must conceal its very name under some other title? As to the whirlwind of modern trade, poor pharmacy is threatened and is in grave danger of being entirely overwhelmed by it. In my address last year I pointed to the fact that pharmacy was attempting the impossibility of posing as a profession while it practised the baser methods of trade; and the answer from the headquarters of the craft, which can be read by all men in the altered features of the *Pharmaceutical Journal*, is that pharmacy is content to be trade, and the Council of the Pharmaceutical Society the leaders of a trade association. Truly there never was a time when it was so essential for the pharmacist to be endowed with the spirit so graphically described by Robert Browning:—

"One who never turned his back, but marched breast forward,
Never doubted clouds would break,
Never dreamed, though right were worsted, wrong would triumph,
Held we fall to rise, are baffled to fight better,
Sleep to wake."

In 1868 pharmacy was granted a magnificent opportunity to associate for its advancement and protection, but those who through registration ranged themselves under its banner failed to embrace it. So deep-rooted, however, was the conviction that such combination was necessary, not merely to the growth and development, but even to the very life itself of pharmacy, that ever and anon fresh suggestions and schemes have been urged forward.

FEDERATION OF LOCAL ASSOCIATIONS.

Of late years local associations of pharmacists, and more recently a federation of such local societies, have been suggested as offering the true panacea for the ills of pharmacy. Far be it from me to think or to speak lightly of any man's earnest endeavour to do something to raise to a higher level of security and usefulness the craft of which he is a member, but observing as I do with anxious thought and care the waste of energy and the diversion of aim which many of these suggested schemes entail, I think it my duty to point out what appears to me to be their inherent weaknesses. As to local associations, the conditions to make these a success do not at present exist, although the success which attends local associations of medical men has been instanced to justify their adoption. In this respect, how different the work and the *personnel* of medicine and pharmacy! Medical men meet each other in friendly conference to consider points of doubt or obscurity in diagnosis, and to determine, if possible, the proper treatment of serious and complicated cases. They also meet in societies to discuss the almost endless chain of cases which show greater or less divergence from the typical text-book type. They meet, as a rule, in some centre where there is a hospital, and perhaps a medical school; consultants meet the general practitioner, and professors meet their whilom students, and there is a bond of union and a common ground for paper and discussion which is largely absent from pharmacy. Then as to the confederation of such associations, a comparison has sometimes been made with the British Medical Association and the success of its local branches; but the great difference here is that while in the British Medical Association every member must first of all be a member of the parent national association before he can even become eligible to be a member of any of its branches, in pharmacy no limitation of local membership to those who are connected with the Pharmaceutical Society has been anywhere carried out,

and in some local associations men who are not even on the Register of Chemists and Druggists, but who are in business as proprietors of so-called drug-stores, have been admitted to membership and allowed to contribute papers for the local society. In the present state of things the only association of real value which is possible is, connection with the parent Society; and when we reach the condition that the vast majority of those who practise pharmacy are connected with the Society, and when in many centres throughout the land there are properly equipped public Colleges of Pharmacy, then the local members of the parent body may meet and discuss to some advantage the problems of pharmacy.

MEMBERSHIP OF THE PHARMACEUTICAL SOCIETY.

Another proposal has been made to consolidate the Society by taking a step to render eligible for membership of the Pharmaceutical Society every person who is on the Register of Chemists and Druggists, and this principle has been so strongly advocated, that from having been a clause in a fairly comprehensive Draft Bill in 1891, it became the one object of a Draft Bill in 1893. It is admitted, however, by its principal supporters that it is not in itself the end which it is sought to achieve, but only a means to that end, which is the promotion of a better system of education for the pharmacists of the future. It is asserted that all the efforts at legislation have failed for want of the moral support which would be the result if membership of the Society were embraced by every man on the Register, and that once we removed the barrier which prevents men who have only passed the Minor examination from becoming members, our Society would in a short time embrace them all, and then the curriculum and all the other improvements of the Pharmacy Act which are so much needed would quickly follow. There is at least one fallacy underlying this proposal. By the Act, if ever it became law, a grave injustice would be done to those men who have made pharmacy respected as much as it is, and who through good and evil report have been loyal to the Society; and finally, it is inherently improbable that, by extending the membership, and as a natural and logical sequence the government of the Society, to the least trained, but numerically the strongest section of those who practise pharmacy, that education would be benefited. I admit the immense advantage and power it would be, in seeking to obtain legislative assistance, if every man on the Register were connected with the Society; but that advan-

tage can be given to the Society at once if every one will join the Society in that capacity for which he is to-day eligible; and if any man who is eligible to join as an associate, or an associate in business, holds aloof from the Society because he cannot join as a member, that man is the enemy of true pharmacy and of himself. The fallacy which underlies this proposal is the assumption that a large number of those on the Register as chemists and druggists would join the Society if they were eligible for membership; all our experience points rather to the inference that it is extremely unlikely that such would be the case. I have said that an injustice would be done to another class of men. In 1868, after several previous invitations, admission to membership of the Society was for the last time offered to those who were holding aloof, and from that time onward there was to be but one way for men to qualify themselves for it by passing the Major examination. A perfectly simple proceeding, but it was left optional to men to do so or not, and, unfortunately, we know that a large number have not qualified themselves. Some of them, however, who did not go beyond the Minor examination, having become important persons in the political and commercial world, would now like to be members of the Pharmaceutical Society. Let them present themselves for the Major examination, and they can in a very short time become eligible for membership of the Society. The Society will welcome all such, and the men themselves will have that self-respect which proceeds from the consciousness that they have entered the Society through the only portal which was honourably open to them, and which did no injustice to others. I cannot understand why there is such a widespread assumption that in pharmacy a man's education is complete before he goes into business on his own account, and that so few present themselves for the Major examination afterwards. In medicine it is entirely different, and there are hundreds, perhaps thousands, of medical men who take a further qualification or a higher degree after they have for many years sustained the burden of practice. The fact is that hundreds of medical men love their profession, and in the exercise of it they are often face to face with serious gaps in their knowledge, which they embrace every opportunity to fill up, that they may do their work with greater satisfaction to themselves and benefit to their patients. Some of them go so far in this direction that, during their hard-earned two or three weeks' holiday you will find them in a hospital or dissecting-room in Paris, Berlin, Vienna, and elsewhere in quest of the special information

they want. All honour to them, but why, I ask, cannot those who practise pharmacy do this, at least, to the extent of passing the Major examination? If they did, we should hear no more demands to be admitted to membership of the Society by a special Act of Parliament, the men would be benefited and honoured, and the Society strengthened, as it cannot possibly be otherwise. Lastly, as to the idea that pharmacy would, from an educational point of view, be benefited, and improvements carried out when the majority to whose care would be committed the future of the Society was made up of men who had contented themselves with the minimum of education legally possible. This is such an absurd assumption that I am surprised at intelligent men gravely putting it forward. From the most charitable view we may take it as fair to assume that a large number—I do not say all—of those who never present themselves in the examination room after the Minor examination do not extend their reading or study much beyond that point; but besides these there are hundreds of men who are on the Register of Chemists and Druggists to-day as the result of having passed the Minor examination, but whose minds are a blank with respect to any scientific knowledge of pharmacy. I do not in the smallest degree intend to reflect on the Board of Examiners. The reason for the phenomenal blank which the minds of many of those who have qualified in pharmacy present is due to the inefficient preliminary education, and to the impossibility of mere examination being effectual to distinguish between cram and education. I ask, is it reasonable to suppose that the end sought—the elevation of pharmacy—will be achieved by such a course? is it likely that men who have never felt the need or worked to qualify themselves by education can or will assist in securing true education for others? Would you commit the government of a University and its educational details to a majority of School Board boys, or would you rather not say that men who have received the University education are better able to understand it down to the requirements of the School Board boy himself? I trust I have said enough to show the unfairness and the unwisdom of this policy, and perhaps with these two examples, of local associations and their federations, and the proposal to admit all on the Register to membership of the Society, I may turn from criticism to some suggestions as to what ought, and I think might, be accomplished if we were in earnest, and finish by reference to some of the duties and pleasures of pharmacy.

AMENDMENT OF THE PHARMACY ACT.

Almost without exception we are agreed that some improvement in the Pharmacy Act of 1868 is a pressing necessity, and must precede any real good which we may hope to accomplish. I do not think pharmacy has had its just share of the attention of the legislature of this country in the past quarter of a century since the passing of the Act of 1868. Within that period the medical men have added five amendment Acts to the statute book, between the years 1873 and 1883. The friendly societies have obtained the passing of eight Acts between 1870 and 1883. In connection with factories and workshops, six Acts of Parliaments have been passed from 1875 to 1883. Solicitors have obtained no fewer than sixteen Acts of Parliament between 1870 and 1883. From this we see that other professional and commercial bodies have had the ear of Parliament, and have made successive and presumably successful efforts to remedy the crudities and mistakes of their earlier legislative Acts, while pharmacists, with such glaring defects as they have discovered in carrying out the Pharmacy Act, that the Society have made no fewer than eight attempts to draft a Bill, have not yet succeeded in getting a single Act passed. The inertia of those outside the Society is not entirely to blame for this; there has been a want of a clearly defined aim on the part of the leaders of pharmacy. They have followed the popular clamour to protect the material and pecuniary interests of pharmacy, rather than to maintain and uphold a high standard of education. If we are to get any good this must cease, and we must have a clear and definite policy, and having, if we can, discovered what is really best for pharmacy and for the public, we must nail our colours to the mast and work until we get it. In the following suggestions I am expressing my own deep convictions, and although to-day they do not dominate the larger section of those on the Register of Chemists and Druggists, I hope the day will come when they will do so.

The central idea and keynote of a new Pharmacy Act must be improved education, and the means of legally enforcing such a course of preparation and study as will secure that those who are registered to practise pharmacy are properly trained and educated to assume such responsibility and to perform their duties. The Act of 1868 in this direction is a complete failure, and that this would be the case was clearly seen and pointed out almost immediately after the Act was passed. At the meeting of the

Conference held at Brighton in 1872, this question of education occupied a very large amount of the thoughts and the time of those who were present, and eighty pages of the Year-Book are filled with the papers and discussions thereon. The President, Mr. Brady, whilst hoping that a great deal of good would accrue from the Pharmacy Act, pointed out in the clearest manner and warned the Society against the low standard of the Preliminary examination, and against the evils of "cram," which would be sure to follow the examination system divorced from training. The whole of those eighty pages are worthy of the careful study of every one who is interested in education, and I would commend them to the younger men who have joined our Society since that date as I cannot give you even a *précis* of them in the middle of this address. Professor Attfield in his paper pointed out that the Act of 1868 had done nothing for education; he said: "I assert that the Pharmacy Act of 1868 has not created any demand for sound pharmaceutical education that did not exist before 1868, and that consequently any attempt to supply such education before the demand arises will result in that loss of effort, time, and money which has hitherto followed nearly every attempt to establish a school of pharmacy in the provinces." How true and prophetic those words were we know to-day by the experience of the many unsuccessful attempts to establish true schools of pharmacy in many centres. Letters were read from prominent pharmacists, and the discussion was taken part in by many eminent men, including Professor Michael Foster, who pointed out the inherent difficulties of examination without direct and positive evidence that the candidate had been properly taught, and also alluded to the wisdom and the advantage of making examination and the examiner the complement of education and the teacher, and of associating the two if the final result is to be a reliable one. In my opinion education must be the basis and the main object of a new Pharmacy Act, and powers must be obtained to make true education a reality in our midst. The Preliminary examination as a measure of the intellectual capacity and the brain training of those who are to be brought into contact with some of the deepest problems of natural science is lamentably inadequate and should be raised as high as the standard of the entrance examination for medicine. A sound and extensive acquaintance with mathematics should especially be enforced. The student who is to enter pharmacy should not be eligible for this examination earlier than sixteen or seventeen years of age. After

this the Act should provide for at least two whole years of compulsory training in the scientific subjects which are the basis of pharmacy—physics, chemistry, and botany. This should not supersede apprenticeship to a pharmacist, but be in addition to it; whether it should precede or follow is a matter upon which there may be a difference of opinion. To the diligent apprentice it would decidedly be an advantage for the apprenticeship to come between the entrance examination and the scientific curriculum, but for the idle and dull there would possibly be in the three years between school life and the University a great loss of the power of brain application. A course of theoretical and practical physics is essential, and the arrangements for properly teaching and demonstrating the various branches of this subject require specially arranged and furnished laboratories, as well as much apparatus of an expensive character. Chemistry and botany in their modern developments can also only be taught with similar facilities. To-day there would be no difficulty in carrying out such an Act of Parliament, and if it were passed into law there could be established in many centres throughout England and Scotland true schools of pharmacy, which would be equipped in every detail to provide the necessary compulsory education. We have only to take the University Colleges throughout the country, and we shall find ready to our hands laboratories and eminent professors, with capable assistants and demonstrators, who are prepared to teach physics, chemistry, and botany as they ought to be taught, and who can and will teach these subjects in any of their technical applications. We have only to add to each of such colleges a man with a thorough knowledge of pharmacy and materia medica, and who would devote his whole time to teaching, to make our school of pharmacy complete. Many of the Bell scholars who have been trained at Bloomsbury Square, as well as others who have passed the Major examination, and to whom a life of teaching has many other attractions than retail pharmacy, would be available for this post. The establishment of a library and museum of materia medica, of which the teacher of pharmacy should be the curator, would complete the equipment. Another important advantage of this arrangement would be that the education would be deprived of the narrow type which more or less attaches to special schools, and would give it that University character which would be of enormous advantage in the after-life of the man. This course of compulsory study, with the necessary complement of examinations, should be the qualification for the

title of pharmacist, and should entitle the individual to be placed on the Register of Pharmacists as a member of the Pharmaceutical Society of Great Britain on the payment of a suitable fee. For the sake of encouraging higher education I should like to see established concurrently, a Fellowship of the Society, to be obtained as the result of one more year of compulsory education, and a much stiffer examination in botany and chemistry, as well as in the history and knowledge of drugs. If we make this object—education—the chief plank in our platform when we go to Parliament, I believe we shall secure a large amount of support from scientific and educated men, whose powerful influence will greatly help us to obtain from Parliament the necessary powers.

The second object to be aimed at must be to safeguard and protect our title, and in seeking to obtain this I would discard all ambiguous words, and especially such words or titles as other men or bodies may have an equally good right to use, and having defined by our curriculum of education and by our examination what we mean by pharmacy, I would restrict the use of any title or description such as pharmacist, pharmaceutist, or pharmaceutical chemist to the men who were registered under this Act.

The third object should be (subject to the rights of those who are registered under the medical and apothecary's Acts) to restrict the compounding of medical prescriptions and the sale and dispensing of poisonous substances, which are to be used as medicines for human beings, to pharmacists. The latter suggestion presents some difficulties, but in my opinion it must not be approached from the trades union point of view, but entirely from the side of the public health and safety. I believe most assuredly that it is in the best interests of the community that the handling and dispensing of the substances which are to be used for the relief of human suffering and the cure of human ailments should be restricted to men who have undergone prolonged and special training and have furnished to the State satisfactory evidence thereof. This is a matter which at some time or other concerns or will concern every individual in the State from the Queen to the peasant, and when pharmacists prove that they believe in and are earnest about education, the country and the Government will give them, for the sake of the people, a reasonable protection in the exercise of their calling, and upon no other basis but education have they the slightest ground or claim to ask for such protection.

Lastly, I should like the proposed Act to deal with the constitution of the Society, and to enable us to have two classes of

men and two only—Members and Fellows of the Pharmaceutical Society of Great Britain—and that each should become such, by virtue of the training, the examination, and the payment of such fees for registration as might be decided on. The government of the Society in the future should be in the hands of a Council of whom one-third should be Fellows, and the Council should be elected annually by the two classes of Members and Fellows voting for their peers.

I am quite aware that there are many difficulties to be overcome, and it would be an easy task for me to occupy the next few minutes of your time in pointing them out, but I will leave it for those who may do me the honour to read and criticise what I have said, but my last word is the conviction of my life, that in order to benefit pharmacy we must approach it from the side of education and raise it to the rank and position of a profession, and not from the side of trade. If it is a question of barter, of pecuniary gains and losses, Parliament will not and ought not to interfere to assist or protect the pharmacist any more than the grocer or the draper, but if it is wise, in the interests of the health of the community, that a class of men should at the outset spend time and money in acquiring special and sufficient knowledge of pharmacy, then Parliament may be expected to restrict the practice of it to such men.

THE DUTIES OF PHARMACY.

I now come to a consideration of the duties of pharmacy. When it has acquired the professional standing which is essential, there is not the smallest reason to doubt but that gradually, but surely, the dispensing of medicines will come to the pharmacist. It will take a generation to make pharmacy fit for the trust, and the same period will under suitable conditions see the transfer of dispensing from medicine to pharmacy. As I pointed out last year, however, this can only come about by the slow process of change in the habits of the people who have grown accustomed to get the prescription and the medicine from the same source. I should like to say a word with respect to two special functions of pharmacy—its relation to the Pharmacopœia and to research.

First, with regard to the Pharmacopœia, at no time in the history of medicine probably was there so much and such widespread interest bestowed by various countries upon their several pharmacopœias, and in this country the necessity for a revision of the British Pharmacopœia, and the suggestion that it shall be

imperial in its character and scope, has drawn forth a number of able medical and pharmaceutical authorities to publish their ideas of what the Pharmacopœia should and what it should not be. I do not intend to summarise these or to take up your time with many details, but shall briefly allude to some points which have been overlooked, and especially to the relation of pharmacy to the work.

The Pharmacopœia has in the past been produced under the general supervision of a Committee of the Medical Council, who have employed one or more experts in pharmacy to act as editors. In the production of the Addendum in 1890, the Pharmacopœia Committee acknowledged to have received "valuable assistance from a Committee of the Pharmaceutical Society," and the latter body have been again invited by the Medical Council, and have appointed a Committee to work on the same lines as in the production of the Addendum. The time is not ripe, and I regret to know that pharmacy has neglected many golden opportunities which would have given it a surer title to recognition, but when pharmacy has given to the world the evidence of the professional spirit and standing which medicine has done, then an ideal Pharmacopœia Committee will be a conjoint board of medicine and pharmacy. Pharmacy will accumulate an amount of knowledge and experience which medicine will cease to work for and to accentuate, and medicine, if it is to be brought to the highest development of precision and accuracy, will not act wisely in disregarding it or in failing to utilise it through the most favourable channels.

THE SCOPE OF THE PHARMACOPŒIA.

With regard to the scope and purpose of the Pharmacopœia. Its aim should be to provide the greatest number of the average medical men and pharmacists with accurate descriptions of all the drugs and preparations which are in reasonably common use at the time of its publication, so that they may judge of the identity and quality from the Pharmacopœia description. It should also provide formulæ which will produce stable and reliable preparations of the drugs in the manner most suitable for their exhibition. In order to reduce to a minimum the necessity for the practitioner or the pharmacist to construct formulæ for himself, the Pharmacopœia should err on the side of inclusion rather than of exclusion. There seems to be a fear that the Pharmacopœia will be too bulky, but I do not share in this. Surely it is

better that every physician who wants to use, and every pharmacist who is called upon to dispense, a preparation of a known drug, should both be able to rely upon a common authoritative standard, than that each should be compelled to possess or compile a Pharmacopœia outside and in addition to the official one. In the latter case it might often happen that the physician would designate a preparation thinking of one authority, and that the pharmacist would dispense it according to another. If no evil were the result, it is impossible for comparisons as to the value of the medicine to be made, and for accurate and precise knowledge to be accumulated. The current Pharmacopœia should be the sole authorised standard of a large and widely distributed profession, and the aim of the Pharmacopœia Committee should be not to overlook anything which would render the book of the greatest service to the largest number. The omissions from the Pharmacopœia provide the happy hunting ground for the cupidity of the empiric and the quack in pharmacy.

PHARMACEUTICAL RESEARCH.

With regard to research; the duty which is incumbent upon every man to do something either to increase the aggregate amount, or to render more exact and scientific the knowledge, which is in the possession of his calling cannot be too seriously taken to heart by pharmacists. It is a great mistake, however, to suppose that at any given period a very large number of men are capable of doing original work, or of making discoveries. It must be a sufficient daily task for most men to keep abreast of the discoveries of others, and to have ready for the practical affairs of daily duty a sufficiently intimate acquaintance with the large body of accumulated facts. If this is the case with men of mature age and experience, how much more must it be so with young men? One of the greatest mistakes connected with modern scientific education is the inducement which has been given to young students to write and to talk before they have read and thought.

Occasionally it may happen that an inspired genius may work upon some original line, or wrest a brilliant discovery from the regions of the unknown, without having performed the drudgery of learning what others have done in the same field of labour, but as a rule, with but very few exceptions, the attempt to make young students pursue research will not be successful. The function of education should be to make men accurate observers, so that they may have confidence that they see what they appear

to do; accurate thinkers, so that they may reason with logical precision from the facts which they have observed; and above all accurate manipulators, so that they may use the instruments of science in a manner to eliminate a very common source of error, faulty workmanship. The balance and the burette and the microscope require more constant and prolonged practice to learn their accurate use than does the spade or the trowel. Education should aim at giving men a sound and extensive foundation in the theory and practice of the science basis of their profession, and should not force them prematurely into an assumption of research. When we have men who, as the result of prolonged education, have taken the Fellowship of the Pharmaceutical Society, as I have suggested in the former part of this address, they will have laid the foundation upon which may be built a training in research methods, and from whose work, if they are able to devote some portion of their lives to research, we may expect good results.

THE PLEASURES OF PHARMACY.

Finally, a few words as to the pleasures of pharmacy, and I could wish that my conscience would have allowed me to embrace this opportunity to dwell entirely upon the pleasures which are brought into our lives by our daily work, if we do but keep the windows of our souls clean and our minds free to receive the impressions which are to many of us a perennial source of delight. If we make gold and personal fame the standard and the goal of our lives, then I think pharmacists as a class have fewer opportunities than most men to realise them, but if we prefer the possession of a cultured mind which in the exercise of our daily work is brought into contact with the greatest men who have ever lived and written upon the deepest and most fascinating subjects of precise knowledge which have ever occupied the human intellect, then pharmacy does indeed afford us the opportunity. After the day's—the long day's—labour is over, the pharmacist can retire to the little room behind the pharmacy (call it shop if you like), which men like Scheele have hallowed, and enjoy a quiet hour in the companionship of the kings and giants of natural science, and all the while that he is enjoying a rich intellectual treat he is only the better fitting himself for his next day's labour. I am almost weary of the political, the trade, and the advertising spirit of official pharmacy, and it is possible that this may be the last time that I shall have an opportunity of publicly saying anything regarding it. If such should be the case, my earnest hope is

that in the autumn of my life I may be able to cultivate more assiduously some little corner of that immense field of scientific knowledge which Pharmacy has laid open to my gaze, and that in the great hereafter I may be found worthy to be endowed with greater powers and a larger appreciation of the truth and beauty of God's universe.

Mr. G. F. SCHACHT moved a vote of thanks to the President for his address. It would be out of place for him to offer any comment upon it, except in the most friendly terms; criticism of the various points raised must come afterwards, when it had been carefully considered, but he might be allowed to say that he had listened to it with very great pleasure. On hearing the address last year it struck him that Mr. Martin would have a difficult task to interest them as much on a second occasion as he did then, but he had certainly triumphed over the difficulty very well. Without entering into any minute points, he might be allowed to emphasise his appreciation of those portions of the address which dealt with the training and education of the young pharmacist, and with the great subject of research, which had been treated with very great judgment. He would not say more, but the address was that of an earnest and courageous man, who had given in a manly, straightforward way a very intelligent view of the relation of pharmacy to the community, and the present conditions of the profession.

Mr. G. E. BRIDGE, as representative of the local association, seconded the motion. He said they must all feel how well the President had grasped the subject he had dealt with. They were all anxious to see pharmacy take a higher position, and no one who lived in such a town as that could doubt the absolute necessity that young men should be better educated before entering on the calling. They were all grateful to Mr. Martin for the way in which he had handled the subject; and he hoped the whole world of pharmacy would seriously consider the points which had been brought forward.

Mr. S. HARDWICK, in supporting the motion, thanked the President for recognising and calling attention to the fact that there were still some men who had a real love for pharmacy; it was on such men they must rely to raise the standard.

Mr. T. B. GROVES put the motion, which was carried unanimously.

The PRESIDENT, in responding, said he wished the enthusiasm

shown at these meetings were better carried out in daily life. A great deal was talked about education, but some stronger assurance that they were in earnest about it was required. That could only come from enlisting into their ranks men who had a love for natural science for its own sake. His old master, Henry Deane, often said that pharmacy as a bread-and-butter calling was drudgery, but pharmacy as an intellectual calling was one by which every man had a right to live, and to demand from the public a fair reward for his labour. In the matter of pecuniary reward he considered the chemist was most modest; he could not be overpaid for the amount of high-class work he gave to his calling. If they could only enlist into their ranks men who had had a good initial training and some love for pharmacy for its own sake, he had great hopes for pharmacy in the future. When the address was printed he should welcome the fullest criticism on every point, and should be glad to offer all the help he could to the solution of the questions raised. His great desire was to help forward in the great problem of lifting pharmacy out of the rut of trade, and making it a branch of the great medical profession.

RECEPTION OF DELEGATES.

Mr. W. A. H. NAYLOR (Hon. Gen. Sec.) then read the following list of delegates :—

Pharmaceutical Society of Great Britain.—Messrs. M. Carteighe (President), J. Harrison (Vice-President), R. Hampson (Treasurer), Atkins, Bottle, Grose, Hills, Martin, Martindale, Schacht, and Warren; the Editor, Sub-Editor, and Secretary.

North British Branch.—Messrs. J. Laidlaw Ewing (Chairman), W. L. Currie (Vice-Chairman), and J. Nesbit.

Pharmaceutical Society of Ireland.—Messrs. G. D. Beggs (Vice-President), Baxter, Payne, Tichborne, and Wells, jun.

Birmingham and Midland Pharmaceutical Association.—Messrs. D. Gibbs, Hines, Alcock, and C. Thompson.

Bristol Pharmaceutical Association.—Mr. G. F. Schacht.

Liverpool Chemists' Association.—Messrs. Buck, Conroy, Cowley, Smith, Symes, and Wardleworth.

London Chemists' Assistants' Association.—Messrs. Guyer, Moore, Strother, and E. A. Umney.

Manchester Pharmaceutical Association.—Messrs. Johnstone, Kemp, Pidd, and Smith.

Brighton Chemists' Association.—Mr. Gibson.

Exeter Association of Chemists and Druggists.—Messrs. H. Wippell, Gadd, and J. Hinton Lake.

Plymouth, Devonport, Stonehouse, and District Chemists' Association.—Mr. C. J. Park.

Swansea and District Association of Chemists and Druggists.—Messrs. Grose and Hughes.

LETTERS OF APOLOGY FOR ABSENCE.

Mr. Secretary NAYLOR reported that letters of regret for non-attendance had been received from Professor Greenish (London), Mr. C. B. Bell (Hull), Mr. R. A. Cripps (Hayward's Heath), Mr. A. W. Gerrard (Chertsey), W. Hayes (Dublin), J. Johnston (Aberdeen), Louis Siebold (Manchester), W. Ward (Sheffield), R. Wright (Buxton), A. H. Allen (Sheffield), Thomas Tyrer (Stratford), Charles Umney (London), R. Reynolds (Leeds), Walter Hills (London), W. F. Wells (Dublin), and W. Flux, Solicitor (London).

Mr. F. RANSOM (Hon. Gen. Sec.) next read the following report of the Executive Committee:—

REPORT OF THE EXECUTIVE COMMITTEE.

Since the last general meeting your Committee has met on several occasions, and various matters affecting the interests of the Conference have received its consideration.

In the last annual report attention was called to the desirability of increasing the membership, and this subject has recently been brought prominently before your Committee in consequence of the serious diminution of income from subscriptions. After full discussion as to the best methods to be adopted to obtain an increase in the number of members, it was decided that a special circular should be drawn up by your President and Honorary Secretaries, and that a copy should be sent to each member of the Conference, urging upon him the necessity of individual effort to obtain candidates for election. A circular to this effect was accordingly distributed in May, and your Committee is pleased to be able to report that during the few weeks that have since elapsed, 87 candidates have been nominated and duly elected to membership. Letters in reply to the circular have also been received from various members expressing their conviction of the

continued usefulness of the Conference, and their appreciation of its official publication, the *Year-Book of Pharmacy*. The result so far is encouraging, but it is important that personal effort in this direction should be maintained. The number of paid-up members on June 30, the end of the financial year, was 1130. During the past year, the Conference has lost 26 members by death, and 14 by resignation, while 136 new members have been elected.

Your Committee has had under consideration certain suggestions relative to the conduct of the general meetings; these, if adopted, would involve an additional morning being devoted to the reading and discussion of papers and the abolition of the afternoon sittings. After a detailed consideration of the proposals submitted, it was decided that it was not desirable to alter the existing arrangements.

The Blue List has been subjected to revision, and certain necessary alterations have been made. Members are invited to suggest subjects which require investigation to be included in a future issue of this List.

A grant of £4 has been made to Mr. Ernest J. Parry, B.Sc., towards expenses incurred in a chemical investigation of sandal wood oil. A report upon the results of his work will be presented to this meeting.

Mr. R. A. Cripps, F.I.C., to whom grants have previously been made in connection with his work upon ipecacuanha, will also report to this meeting.

The Conference has lost a distinguished honorary member by the death of Professor F. A. Flückiger, of Berne. On several occasions he has generously contributed valuable papers to the meetings of this Association. From his numerous researches in materia medica, and especially as joint author with the late Daniel Hanbury of that unique work *Pharmacographia*, his name has long been familiar to all English-speaking pharmacists.

Mr. Louis Siebold, F.I.C., F.C.S., has been re-appointed Editor of the *Year-Book*, and the MS. of Parts I. to IV. is now in the hands of the printers.

The reception by the President was held last night at the Hotel Mont Dore, and was largely attended by members and their friends.

FINANCIAL STATEMENT FOR THE YEAR ENDING JUNE 30TH, 1895.

The Hon. Treasurer in Account with the British Pharmaceutical Conference.

1894.	Dr.	£	s.	d.	£	s.	d.
July 1.	To Assets forward from last year :—						
	„ Cash in Secretary's hands	0	17	0			
	„ Cash at Bank	0	10	9			
	„ Messrs. Churchill's Account	82	18	5			
					84	6	2
1895.							
June 30.	To Sale of Year-Book by Publishers	14	6	8			
	„ Advertisements, 1894 volume	65	14	6			
	„ „ 1893 „	2	12	0			
					68	6	6
	„ Members' Subscriptions, Amount received from July 1, 1894, to June 30, 1895.	454	9	9			
	„ Index Book, Sales by Publishers	0	0	0			
	„ „ „ „ Secretary	0	0	0			
					0	0	0
	„ Unofficial Formulary, Sales by Publishers	13	1	0			
	„ Unofficial Formulary, Sales by Secretary	0	2	0			
					13	3	0
	„ Returned by Grantee				3	0	0
	„ Liability on Outstanding Account :—						
	Assist.-Secretary's Salary	13	15	0			
					£651	7	1

1895.	Cr.	£	s.	d.	£	s.	d.
June 30.	By Expenses of Year-Book :—						
	Printing, Binding, Publishing, etc.	292	7	0			
	Postage and Distributing.	23	13	5			
	Advertising and Publishers' charges	17	10	6			
	Editor's Salary	150	0	0			
	Advertising in Conference Handbook	2	10	0			
	Foreign Journals for Editor	5	17	6			
					494	18	5

1895.	Cr.	£	s.	d.	£	s.	d.
June 30.	By Unofficial Formulary :—						
	Printing, Binding, etc.	13	2	1			
	Advertising	5	9	0			
	Publishers' Commission	1	6	0			
	Carriage	0	2	0			
					19	19	1
	„ Sundry Expenses :—						
	Assistant Secretary at Oxford	10	0	0			
	Copies of President's Address	0	13	6			
					10	13	6
	„ Assist.-Sec.'s Salary from July 1, 1894, to June 30, 1895	45	0	0			
	„ Rent of Office	10	0	0			
					55	0	0
	„ Blue List: Printing	3	0	0			
	Postage	2	10	3			
					5	10	3
	„ Postages				11	7	11
	„ Printing and Stationery				9	19	0
	„ Bank Charges				0	0	5
	„ Petty Cash Expended				4	14	10
	„ Liabilities of last year, since paid				5	14	1
	„ Grant for Research				4	0	0
	„ Cash in Secretary's Hand: Postage	1	16	5			
	Petty Cash	0	9	7			
					2	6	0
	„ Cash at Bank				27	3	7
					£651	7	1

The Bell and Hills Fund.

1894.		£	s.	d.	£	s.	d.
July 1.	To Balance in hand	15	0	3			
1895.							
June 30.	„ One Year's Dividend on Consols	9	11	8			
					24	11	11
	By Purchase of Books for Oxford	8	2	1			
	„ Dividend on Consols overcredited by Bank, 1893-94	0	2	4			
					8	4	5
	Balance in Bank				£16	7	6
	Assets :—						
	Cash Balance at Bank	16	7	6			
	£360 2½ Consolidated Stock	360	0	0			

Examined and found correct, { C. CLAYTON, } Auditors.
 { F. SPINNEY, }

July, 1895.

THE PRESIDENT moved the adoption of the Report of the Executive Committee and the Financial Statement. He said the report was very satisfactory, especially in view of the experience of the last month or two. During the last year there was a feeling in some quarters that the Conference was becoming moribund, and in consequence a circular was sent out which had resulted in obtaining forty-seven new members in a very short time, and what was still more gratifying was the tone of the letters received. Many had written saying how thoroughly their sympathies were with the Conference, how they appreciated the *Year-Book*, and stating their determination that the usefulness of the Conference should not be diminished for want of resources. Several wholesale firms had expressed their readiness to give special donations if financial assistance were required, so that there was no fear of the Conference ever being in financial difficulty. During the past year they had lost forty members, twenty-six by death, and it was evident that to meet losses by death and resignation it was necessary that a considerable number of new members should be added each year.

Mr. CONROY (Liverpool) seconded the motion.

Dr. SYMES (Liverpool), in supporting the motion, expressed his conviction that every member would, if it were thought advisable, willingly increase his subscription by 10s. per annum, rather than there should be any pecuniary pressure. He thought such a measure would be preferable to obtaining special donations from outside.

The motion was then put and carried unanimously.

THE UNOFFICIAL FORMULARY COMMITTEE.

In the absence of Mr. Martindale, Mr. NAYLOR next read the report of the Unofficial Formulary Committee, as follows:—

To the British Pharmaceutical Conference in Session.

Having issued a revised Formulary in July last year, this Committee has not since taken any steps. Suggestions from correspondents have been received and noted, but as some members of the Committee are also members of the Pharmacopœia Committee of the Pharmaceutical Society of Great Britain, the powers of the Formulary Committee will probably be in abeyance

for a time. Still it is desirable that the latter Committee should be re-appointed by the Conference.

July 18, 1895.

WM. MARTINDALE, *Chairman*.

The reading of papers was then proceeded with, the first being one on—

SANTAL WOOD OIL.

By E. J. PARRY, B.Sc., F.C.S.

In the recent advances made in quantitative methods for the examination of essential oils, santal oil appears to have been entirely neglected. Chapoteant, after a very careful study of the oil, announced some time ago that it consisted almost entirely of two bodies, $C_{15}H_{26}O$, an alcohol termed santalol, and $C_{15}H_{24}O$, probably the corresponding aldehyde, which only occurs in small quantities. These facts made me think that a quantitative method for the estimation of the value of the oil would not be difficult to apply. Naturally I turned my attention in the first place to the presence of the aldehyde. But although unable to devise any modification of the well-known bisulphite method to separate this body, I was able to confirm its presence, and hope later on to have a method for its estimation to announce. The alcohol then, of course, occupied my attention. I may here mention that there are present in normal santal oil traces of an acid, probably due to oxidation of the two bodies above mentioned, and variable quantities of a saponifiable oil, possibly an ester of santalol. Santalol, however, appears to constitute the bulk of the oil, and the aldehyde lowers the gravity of the oil, whilst the saponifiable oil raises it. After a number of experiments I found that the best way of valuing the oil was by an estimation of the amount of santalol (or other alcoholic bodies if they are present, expressed in terms of santalol). This is effected by conversion of the santalol into an acetate, and an estimation of the amount of acetic acid present in the acetylated oil. To save tedious calculations the result may be expressed in terms of potash necessary to saponify the acetylated oil. About 10 grammes of the oil are digested with an equal volume of glacial acetic acid (this should be at least 99·5 per cent.) in a pressure flask for an hour and a half at $150^{\circ}C$. The resulting oil should be well washed in a separator until the last traces of acetic acid are removed. After drying, the oil is

saponified with alcoholic potash in the ordinary way, and the amount of potash used is noted. In my first set of experiments very constant results were found. In the first column the percentage of potash used for saponifying the original oil are given. The second figure gives the amount of potash necessary to saponify the acetylated oil, and the third column gives the percentage of santalol present in the original santal oil, assuming, of course, the correctness of Chapoteaut's statement.

No.	Amount of K O H to saponify.		Percentage of Santalol.
	Original oil.	Acetylated oil.	
1	0·96 p.c.	19·33 p.c.	86
2	0·88	19·09	85
3	0·85	18·66	83
4	0·62	19·26	87
	0·63	19·85	90

(Decimals neglected.)

The first figure confirms Cripps' results, viz., that 1 p.c. of K O H is sufficient for saponification of the oil. The second column shows what a large quantity of acetic acid has been taken up, and as will be seen later is sufficient to detect adulteration with cedar wood oil, as this oil contains very little of an alcoholic nature.

The specific gravities and iodine absorptions of the five samples above described are given in the following table. The iodine solution used is Hübl's, and the only precautions to be observed are to allow the action to take place for ten hours, and to use large excess of iodine. The results are all within the limits 190 to 210, and are more reliable than bromine absorptions.

	Specific gravity.	Iodine absorbed.
1 .	·9803	199·5 p.c.
2 .	·9779	195·7 „
3 .	·9800	204·0 „
4 .	·9794	210·3 „
5 .	·9787	190·6 „

These results suggested to me an explanation of the increase in gravity of the oil as distillation proceeded. Particulars of this were given in a paper by Mr. Conroy at the Nottingham Conference. Mr. Conroy was kind enough, at my request, to distil a 20 lb.

batch of oil, and send me the first, middle, and last two ounces. These were examined by the methods above described, with the results given below. These results prove that the greater part of the aldehyde comes over in the earlier fractions, and that the saponifiable oil, of highest boiling point, increases in quantity as distillation proceeds, accounting for increase in gravity. The iodine absorptions of the three fractions all fall within the limits above suggested, namely, 190 to 210 per cent.

	Sp. gravity.	Iodine.	KOH for original oil.	KOH for acetylated oil.	Santalol.
First fraction .	·9649	197·9	0·44 p.c.	17·03 p.c.	76 p.c.
Middle fraction .	·9758	200·6	0·65 „	20·44 „	93 „
Last fraction .	·9805	190·9	1·04 „	19·66 „	87 „

In order to ascertain if any appreciable change took place during the acetylation, other than the formation of the alcoholic acetate, the iodine absorption was taken of a sample after acetylation. Calculated for the increased weight it should have been 172·6 p.c.; found 173·0 p.c. The constitution of the oil appears therefore not to be materially altered by this treatment.

As cedar wood oil is a very frequent adulteration of santal wood oil, I examined four samples by the method above described. The oil evidently contains very small quantities of cedar camphor, which is in agreement with the lately published statement that normal cedar wood oil does not contain much, if any, cedar camphor since cedar camphor would most probably be found associated with the corresponding alcohol. The following amounts of potash were found necessary to saponify the acetylated cedar oils:—

1	2·32 p.c.
2	2·21 „
3	2·13 „
4	1·72 „

The average quantity required is 2·1 per cent. It is, therefore, clear that this method enables one to detect and estimate approximately the quantity of cedar wood oil in an admixture of the two oils. Of course, further experiments may show that slightly wider limits are necessary in the figures, but if this be so, it can only be to a very slight extent, and would not alter the general value of the process. In conclusion, I may say that the several samples

here dealt with are of absolutely guaranteed authenticity, for which I am able to vouch with certainty. I have to thank Mr. Michael Conroy, of Messrs. Evan, Sons & Co., for his kindness in preparing me the three special samples referred to above, and Mr. Henry Wheeler, of Messrs. Corbyn, Stacey & Co., for the samples of cedar wood oil.

In the discussion on this paper, Mr. M. CONROY said Mr. Parry was entitled to a hearty vote of thanks for this paper, which brought out a most important fact, and gave a method for detecting the adulteration of santal wood oil with cedar wood oil, which was a very common form of sophistication. He had tried many experiments himself with the object of finding a means of detection, including the sulphuric acid test brought forward by Mr. Parry last year. He must say that was not a success, for he adulterated samples to the extent of 10 per cent., and was unable to detect the adulterant afterwards by that means. He hoped this method would be more successful, as he had every reason to think it would.

Mr. JOHN MOSS said he had not been able to follow the figures given by Mr. Parry in reading the paper, and rather wished there had been a diagram table, though some doubt was thrown last year on the utility of such aids. As he understood, Mr. Parry suggested a method of distinguishing between santal wood and cedar wood oils based on their saponification, and that it required 19 parts of potash to saponify santal wood oil, whilst 2 parts would saponify cedar wood oil.

Mr. PARRY said those figures referred to the acetylated oils.

Mr. MOSS said this was a very marked distinction, but the question which arose was whether an adulteration of 5 per cent. of cedar wood oil would show a sufficient distinction to base a conclusion upon. He had the same idea as Mr. Conroy, that it was very difficult to detect this adulterant if it were only present in small quantities. The two oils themselves were fairly easily distinguishable; it was the mixture of a small proportion of the cedar wood oil which caused the difficulty.

Mr. ALCOCK said he had recently found castor oil in capsules of santal wood oil, and he should like to know whether its presence would interfere with the saponification equivalent of the acetylated oil. He feared the castor oil would not be removed in the washing-out process, and might interfere with the exact determination of the iodine equivalent in the final stage.

Mr. J. C. UMNEY said he had tried a good many experiments in connection with the saponification of acetylated oils, particularly the oils of peppermint and rosemary, and in both cases it acted perfectly well. If it were applicable to the estimation of the alcoholic constituents of santal wood oil, so that one need not depend upon the solubility of oils in alcohols of different strengths, or on the amount of rotation, for detecting the presence of cedar wood oil, it would be a great advantage. In the case of rosemary oil he had not been successful with glacial acetic acid, but that might be due to the fact that rosemary oil only contained about 15 per cent. of alcohol, whilst in santal wood oil there was 80 or 90 per cent. It answered very well with peppermint oil.

The PRESIDENT, in putting the vote of thanks, said the paper was of great value, for the essential oils were a puzzle to most of them, and any investigations of this kind, especially with regard to such an important article as santal wood oil, they were very grateful for.

Mr. PARRY, in reply, said the sulphuric acid test was not suggested by him as an original one, he merely brought it before the Conference as having been published in a French journal. He had found fairly good results with an adulteration of 10 per cent. He did not think the method now brought forward, could be relied on to detect an adulteration of 5 per cent., but for 10 per cent. it could. The commercial adulteration of the oil was generally much more than 5 per cent.; of course it was very desirable to have a means by which even 1 per cent. of adulteration could be detected, but he did not claim that this test was so delicate. He had examined a sample of one of the best known brands of foreign santal wood oil in capsules, and found the amount of potash necessary for saponification was only 14.6 per cent., as against 18.9, which it should have been, and this worked out to an adulteration of 25 per cent. He found further that this was a mixture of santal wood oil and balsam of copaiba. Castor oil would be very easy of detection, even to the extent of 5 per cent., by the amount of potash necessary for its saponification. Five per cent. of castor oil would require over 2 per cent. of potash. The iodine absorption would also show it. With regard to Mr. Umney's remarks, he might say that acetic anhydride and glacial acetic acid yielded identical results. He used the anhydride for some time, but found a difficulty in removing the last traces.

In the absence of the author the following paper was read by Mr. Naylor:—

NOTES OF A RESEARCH UPON IPECACUANHA.

By R. A. CRIPPS, F.I.C.

At the Cardiff meeting of the British Pharmaceutical Conference, in conjunction with A. Whitby, I read a paper showing the general results of the proximate analysis of a sample of ipecacuanha, this being intended as the first part of a research upon that drug.

Having thereby obtained sufficient data to indicate the lines of future research, it had been my intention to examine each of the important constituents, operating upon a larger quantity. From various causes this research has been several times unavoidably suspended; and, were it not that, being the recipient of a grant from the Executive of this Conference, I feel it imperative that I should contribute some facts to the present meeting, I should not now appear before you with a contribution of so unfinished a character.

For the more detailed examination 800 grammes of ipecacuanha were exhausted by successive percolation with ether (sp. gr. 717) and rectified spirit. The solvents were recovered by distillation, in the latter case under reduced pressure.

1. *Ether Extract*.—0.44 per cent. of root. By petroleum ether this was almost entirely dissolved, and on removal of that solvent the residual oily matter was found to be mostly soluble in alcohol, yielding a fluorescent solution, which by titration indicated acidity equivalent to 0.22 per cent. of oleic acid, by direct weighing 0.205 per cent. was obtained. The fatty acids were converted into lead salts, and treated with ether, whereby oleate of lead was obtained equivalent to 0.15 per cent. of oleic acid. This ethereal extract contained a trace of an alkaloid, but no glucoside, and no salicylic acid or salicylate.

The actual results obtained were:—

Oleic acid	0.15 per cent.
Palmitic (?) acid	0.055 "
Neutral fat	0.14 "
Wax	0.04 "
Resin	0.025 "
Alkaloid	Mere trace.

2. *Alcoholic Extract*.—As on the former occasion the residue from distillation of the solvent was dissolved in water, filtered, and the filtrate extracted by agitation with chloroform whilst still acid, and then successively by ether and chloroform after rendering alkaline by ammonia.

The *Acid Chloroform Extract* contained some alkaloid, but this has not yet yielded results of value for publication.

The *Alkaloid Extracted by Ether* from alkaline solution was dissolved in 25 c.c. absolute alcohol; 25 c.c. of ether (717) added—the solution remaining clear—then 50 c.c. of ether containing about 25 per cent. of hydrochloric acid gas, whereby a nearly white precipitate was formed, which passed into a tenacious mass; the clear liquid was poured off, and more ethereal HCl added in portions of 50 c.c., until the whole of the alkaloid was precipitated, the various fractions *a*, *b*, *c*, *d*, *e*, and *f* being obtained.

Each of these alkaloidal salts was dissolved in 100 c.c. of distilled water, and portions set aside, only one "*b*" formed crystals of the hydrochlorate.

The compound "*f*" was very small in quantity, "*a*" and "*e*" were therefore chosen for conversion into gold and platinum double salts. The filtrate from each of these compounds was treated with sulphuretted hydrogen, filtered, and the filtrate agitated with ether after rendering alkaline by ammonia. The traces of alkaloid so obtained were weighed, and the weight deducted from the original amount taken, for calculation of the percentage present in the double salts.

Platinum Salts (anhydrous at 100° C.)

	Alkaloid " <i>a</i> ."	Alkaloid " <i>e</i> ."
Platinum . . .	21.30 p.c.	21.57 p.c.
Alkaloid . . .	55.24 p.c.	53.81 p.c.

The formulæ for Paul's alkaloids require—

	Emetine m. w. 248.	Cephaeline m. w. 234.
Platinum . . .	21.46 p.c.	22.15 p.c.
Alkaloid . . .	54.78 p.c.	53.34 p.c.

Kunz's formula (m. w. 508)—

Platinum . . .	21.18 p.c.
Alkaloid . . .	55.38 p.c.

Gold Salts (dried at 49° C., decomposed at 100° C.).

	Alkaloid " <i>a</i> ."	Alkaloid " <i>e</i> ."
Gold . . .	32.44 p.c.	32.20 p.c.
Alkaloid . . .	40.95 p.c.	41.01 p.c.

Paul's formulæ require—

	Emetine.	Cephaeline.
Gold . . .	31.45 p.c.	33.22 p.c.
Alkaloid . . .	40.96 p.c.	39.56 p.c.

Kunz's formula requires—

Gold . . .	32.13 p.c.
Alkaloid . . .	41.55 p.c.

The gold salts of these two alkaloids are practically identical in composition, and the figures agree closely with those required by emetine (Paul), neither corresponding with cephaeline nor with Kunz's formula for emetine. Neither of the platinum salts corresponds with that of cephaeline, that of "a" agrees fairly with either Paul's or Kunz's emetine, and the amount of platinum in "e" compound is near that required for Paul's emetine; the low figure for alkaloid is in this case probably due to experimental error.

These being extreme fractions of the original alkaloidal substance (except the very small amount of "f"), it is reasonable to conclude that each of the other fractions is of the same composition, and therefore that this sample of ipecacuanha contains no cephaeline, but only emetine, in the ether-soluble alkaloid.

When the alkaloid from either of the fractions "a" to "e" is dissolved in chloroform, and the solvent allowed to evaporate spontaneously, the residue obstinately retains chloroform. This compound fuses at about 50° C., but does not lose its chloroform even at 60° C., at which temperature about 14 per cent. is retained. When cold the compound is quite hard, and the addition of dilute hydrochloric acid causes the separation of chloroform in drops. At 82° C. the chloroform volatilises, leaving the alkaloid pure.

A solution of either of these fractions in water does not yield quite the whole of the alkaloid when agitated with ether and ammonia. In every case a trace of alkaloid was left, which readily dissolved in chloroform to a yellowish fluorescent solution, just as was observed when treating the original solution of the alcoholic extract of the root. This is worthy of further research, for it leads to the suggestion that the chloroform-soluble alkaloid may be produced by the action of the alkali upon emetine. Had this occurred only in one or two of the fractions, it might have been due to impurity, but its universal production would seem to negative such an explanation.

The figures for platinum salts given above are those formed in the presence of an excess of platinic chloride; when the alkaloid is in excess the proportion of metals is only 16·45 per cent.

The Alkaloid soluble in Chloroform.—I have not yet obtained any results from this alkaloid, of a nature suited for publication, without further work.

* * * *

Whilst this inquiry has been in progress, I have also carried

out a few experiments bearing upon points of interest connected with the chemistry and pharmacy of ipecacuanha.

1. Arndt having published further information with regard to his volatile alkaloid, which he states to be identical with choline, I have repeated his process, using 100 grammes of the root, but have been unable to detect any trace of volatile alkaloid.

2. Arndt has described a process for the determination of ipecacuanha alkaloids based upon his researches on the volatile alkaloid. He treats the powdered root with sodium carbonate and ferric chloride in presence of boiling methyl-alcohol (60 per cent.) under an inverted condenser, filters, and evaporates the filtrate, whereby choline is dissipated; he then takes up the residue with dilute ammonia, and agitates with chloroform to extract the alkaloid. This solution is separated, agitated with dilute acid, and the aqueous liquid finally titrated with Mayer's solution. I can confirm Arndt's statement that this process yields lower results, having obtained 1.32 per cent. of alkaloids from a sample which yielded to Lyons' process 2.45 per cent. The working of Arndt's process is very tedious.

3. As already published, I have compared Keller's process of assay with that of Lyons; at the same time I found that titration with hydrochloric acid, using iodeosine as indicator, yields excellent results, the alkaloidal residue from Lyons' process or my acetic ether process yielding almost theoretical results, Keller's, alkaloids (by original process), as might be anticipated, being less pure. The following figures are examples:—

Process.	Alkaloid weighed.	Alkaloid titrated. Equiv., 251.	Alkaloid titrated. Equiv., 248.
Lyons (1)	39.3 Mg.	39.5	38.6
(2)	43.0 "	42.0	41.0
Keller (1)	102.0 "	87.0	85.0
(2)	111.0 "	95.9	93.6
Acetic ether	31.1 "	31.0	30.3

Methyl-orange gives results almost equally good.

4. It has been stated that if a weaker acid be used for extraction in the preparation of ipecacuanha wine, a more satisfactory product results. I can confirm this statement. Two portions of the root, each of half a pound, were exhausted, the one by the official process, the other by percolation with dilute acetic acid 1-20. The extract from the latter was more readily dried and pulverised than

that of the former. They weighed, B.P., 900 grains; weak acid extract, 803 grains; alkaloids, 8.24 per cent. and 10.6 per cent., corresponding to 73 grains and 85 grains respectively.

The PRESIDENT regretted that the author of the paper was not present to answer questions, but he was sure he would be pleased to receive criticisms upon it.

Mr. F. C. J. BIRD said he had been much interested in the statement that the use of weaker acid produced better results in the preparation of extract of ipecacuanha. That was almost self-evident to any one experienced in the preparation of large quantities, and in a paper communicated by himself he had described experiments confirming that view. With regard to the larger yield given by Lyons' process of estimation as compared with that given by titration with Mayer's solution, he had not any experience of the former process, having generally worked the process devised by Mr. Ransom, but the difference was certainly very great, generally amounting to about 30 per cent. of alkaloid. He should be glad if any one who had had experience of the two processes could throw any light on the cause of the discrepancy.

Mr. F. RANSOM said he could confirm what Mr. Bird said, that it would be desirable to use a weaker acid if the extract were to be retained at all, and was glad to see this was recommended by Mr. Cripps. With regard to the Lyons' process for estimating the alkaloid, he always considered that it gave too high results—higher than those given by almost any other published process, and he was very doubtful if it was to be relied on.

Mr. J. C. UMNEY said he had tried Lyons' and Keller's methods on the same sample, and found twice as much total alkaloid in the case of Keller's process as in the case of Mr. Ransom's process. He did not know anything about the volatile alkaloid referred to. Some time ago Dr. Paul found a second alkaloid in ipecacuanha, and gave a process for the separation of the two. Working recently on a large scale, he (Mr. Umney) came across what possibly might be the explanation. After first percolating with spirit to make the liquid extract, it was subsequently mixed with slaked lime and re-percolated, and on recovering the spirit from the marc it was found to be strongly alkaline. He tried to separate from the recovered spirit the body which gave this alkaline reaction, but up to the present had not succeeded in doing so. On mentioning the matter to Dr. Paul, he asked him to give him

all the residues after neutralisation, and he believed he was now working on the subject.

Mr. F. C. J. BIRD said the odour possessed by the spirit recovered from the distillation of lime and ipecacuanha always seemed to him to resemble that of trimethylamine.

The PRESIDENT said Mr. Cripps was entitled to a vote of thanks for this contribution. It was very satisfactory to find that he with his platinum and gold salts confirmed so closely the results that Paul and Cownley had arrived at with regard to emetine and cephaeline.

The following paper was read by Mr. Farr:—

THE TINCTURES OF THE BRITISH PHARMACOPŒIA:

A REPORT ON THE STRENGTH OF COMMERCIAL SAMPLES.

BY E. H. FARR AND R. WRIGHT, F.C.S.,

Pharmaceutical Chemists.

The work previously published by us upon the subject of alkaloidal drugs has been done with the following objects in view:—

1. To ascertain the menstruum best adapted for securing perfect exhaustion of the drug.
2. To devise accurate and reliable methods for the estimation of the alkaloids in the tinctures.
3. To find the average alkaloidal strength of the tinctures.
4. To ascertain in what cases it might be feasible and desirable to set up definite alkaloidal standards for the tinctures.

These branches of our investigation having been fairly well worked out, it was thought that an inquiry into the strength and quality of commercial tinctures as sold and dispensed by retail pharmacists might be attended with good results, and that a report upon such tinctures might also prove of interest to the members of this Conference. In order to obtain the requisite samples, several pharmacists residing in different parts of the country were approached, and through their kind instrumentality we obtained the samples now reported upon. In making application for samples it was requested that they be obtained from pharmacies of at least average class; our object being, not to get up a case against our fellow-pharmacists, but simply to ascertain to what extent the case for the standarisisation of the alkaloidal tinctures

TABLE I.
Showing the Amount of Alkaloids in Grammes from 100 c.c. yielded by the Tinctures.

Tincture.	1	2	3	4	5	6	7	8	9	10	11	12	Average. F and W.	Average.	Average, F and W.
Aconite . . . . .	.020	.010	.048	.056	.048	.044	.046	.044	.042	.054	.044	.050	.044	.050	.050
Belladonna . . . . .	.016	.016	.017	.020	.015	.008	.031	.018	.018	.017	.021	.026	.018	.026	.0246
Cinchona . . . . .	.54	.22	.40	.52	.60	.66	.410	1.18	.49	.63	.72	.59	.58	.59	.91
Colchicum . . . . .	.072	.060	.064	.060	.020	.028	.046	.072	.080	.058	.056	.078	.058	.078	.078
Conium . . . . .	.028	.010	.012	.040	.016	.036	.035	.014	.210	.020	.024	.069	.043	.069	.083
Gelsemium . . . . .	.032	.032	.024	.044	.044	.032	.030	.024	.041	.025	.026	.027	.032	.027	.044
Hyoscyamus . . . . .	.010	.011	.016	.009	.008	.010	.009	.009	.011	.008	.010	.009	.010	.009	.0105
Jaborandi . . . . .	.014	.024	.048	.144	.120	.100	.096	.036	.052	.044	.048	.024	.062	.024	.095
Lobelia . . . . .	.018	.040	.028	.040	.044	.036	.034	.030	.040	.027	.031	.025	.033	.025	.038
Nux Vomica . . . . .	.205	.190	.220	.210	.190	.224	.216	.220	.228	.144	.184	.200	.203	.200	—
Opium . . . . .	.308	.724	.814	.668	.678	.618	.922	.870	.817	.720	1.04	1.12	.775	1.12	.579
Stramonium . . . . .	.032	.016	.024	.016	.016	.018	.020	.017	.015	.025	.015	.017	.019	.017	.0256
Veratrum . . . . .	.104	.152	.104	.152	.092	.141	.082	.126	.068	.074	—	—	.110	—	.122

TABLE II.—Showing the Amount of Extract in Grammes from 100 c.c. yielded by the Tinctures.

Tincture.	1	2	3	4	5	6	7	8	9	10	11	12	Average. F. and W.
Aconite . . .	1.96	1.08	2.44	1.72	1.08	.64	1.00	2.02	2.72	2.08	.98	2.24	1.66
Belladonna . .	1.38	1.00	1.18	1.14	1.04	.70	.78	1.30	1.22	.80	.68	1.26	1.04
Cinchona . . .	3.76	3.96	3.61	3.90	4.36	5.24	3.68	7.46	4.04	6.76	5.68	4.52	4.92
Colecium . . .	0.96	1.08	1.44	0.90	0.78	0.76	2.32	2.18	1.26	1.34	.94	1.16	1.00
Conium . . .	.96	3.12	1.98	1.10	1.02	0.90j	1.14	.56	1.86	.80	.82	1.42	1.21
Gelsemium . .	1.78	1.38	1.74	2.36	2.14	1.84	1.74	1.48	1.82	2.22	1.84	1.84	1.80
Hyoscyamus . .	3.30	3.32	3.44	3.98	3.78	3.28	3.28	2.96	3.76	3.30	3.26	3.80	3.52
Jaborandi . . .	3.06	3.86	3.96	4.96	4.70	4.17	5.22	4.02	2.80	3.72	4.6	5.82	4.95
Lobelia . . .	9.20	2.12	3.14	2.16	1.90	2.50	2.96	1.14	.73	1.12	1.76	1.54	1.83
Nux Vomica . .	1.16	1.14	1.22	1.12	1.22	1.22	1.22	1.18	1.12	1.02	.54	1.24	1.12
Opium . . .	3.76	3.80	3.68	4.66	3.50	5.55	3.72	3.82	4.06	3.40	3.88	4.74	4.05
Stramonium . .	.54	.56	.86	.40	.42	.50	.72	.70	.33	1.92	.58	1.18	.77
Veratrum . . .	1.50	2.28	1.28	2.28	1.96	1.46	1.14	1.12	1.12	1.04	—	—	1.51

TABLE III.—Showing the Specific Gravity of the Tinctures.

Tincture.	1	2	3	4	5	6	7	8	9	10	11	12	Average.
Aconite . . .	.847	.857	.844	.847	.847	.852	.846	.854	.913	.856	.840	.857	.855
Belladonna . .	.928	.922	.933	.930	.928	.925	.953	.938	.920	.948	.895	.931	.929
Cinchona . . .	.953	.940	.945	.943	.945	.951	.946	.953	.951	.953	.944	.950	.947
Colecium . . .	.930	.922	.935	.925	.933	.955	.942	.931	.925	.933	.925	.931	.932
Conium . . .	.938	.940	.927	.930	.931	.930	.935	.940	.908	.931	.931	.932	.931
Gelsemium . .	.912	.914	.930	.930	.933	.922	.938	.938	.924	.935	.931	.935	.928
Hyoscyamus . .	.985	.964	.938	.938	.935	.935	.942	.938	.934	.950	.937	.939	.940
Jaborandi . . .	.938	.940	.933	.935	.938	.958	.946	.939	.943	.951	.940	.953	.943
Lobelia . . .	.925	.930	.940	.938	.914	.933	.950	.930	.949	.938	.933	.940	.935
Nux Vomica . .	.802	.891	.889	.889	.894	.901	.895	.889	.898	.892	.891	.894	.892
Opium . . .	.940	.966	.941	.960	.930	.940	.959	.939	.941	.943	.895	.947	.949
Stramonium . .	.922	.927	.932	.927	.922	.932	.936	.927	.936	.935	.925	.925	.929
Veratrum . . .	.847	.854	.856	.880	.891	.844	.842	.866	.874	.937	—	—	.871

might be strengthened or otherwise by an examination of commercial samples.

In addition to the estimations of alkaloid and extractive matter, we have in the present series of experiments taken the specific gravity of each tincture, thinking it desirable to ascertain whether the official menstrua were closely adhered to in preparing the tinctures. In this particular our results indicate no very important deviation from the official instructions.

In estimating the alkaloids present in the tinctures we have followed in each case the process originally used by us, and which will be found fully described in various numbers of the *Pharmaceutical Journal* for the year 1891-2, and of the *Chemist and Druggist* for 1892-3, under the headings of notes on the individual tinctures.

The amount of extractive was ascertained by the evaporation of 10 c.c. of the tincture in a porcelain dish having a flat bottom and drying the extract at 212° F. until constant; and the results obtained are given in Table II.

In the tables we also give the average of our former experiments.

Reference to Table I. discloses a very wide range in alkaloidal value, some of the tinctures being twice or three times the strength of others, and it may be a matter of surprise to many to find that this is the case even with such tinctures as opium and cinchona, both of which are directed to be made from standardised drugs. In the case of the tincture of *nux vomica*, too, it might be anticipated that the variation would be practically *nil*, but it appears that such is not the case, for whilst in no instance is the B.P. standard exceeded, one tincture is only about two-thirds as strong as it should be, and several others are deficient in alkaloid.

The tinctures of conium were most of them absolutely worthless, and in only one instance did the sample appear to have been made from dried green fruit as directed in the B.P. A reference to the tables of results also serves to bring out another fact, viz., that the relative proportions of alkaloid and extractive contained in different samples of the same drug vary between very wide limits. Attention has been directed to this point on several previous occasions, and its bearing upon the question of tincture standards is obvious.

In conclusion we take this opportunity of thanking those gentlemen who so kindly assisted us in procuring the samples from their various districts.

The PRESIDENT, in inviting discussion, said that tinctures, if properly made, ought to be amongst the most definite and certain preparations in the Pharmacopœia. They were all strong solutions of extractives or alkaloids, made with spirit, and if the tinctures were carefully made originally, most of them ought to keep indefinitely, and the variations in tinctures collected from different parts of the country ought to be extremely small. It was lamentable to discover that in a preparation such as tincture of aconite, such a wide difference was observed, and it must very much upset the calculations of medical men if they had been accustomed to prescribe a weaker tincture to find a much stronger one supplied. It was satisfactory to the commercial honour of pharmacy to know that the specific gravity differed so little, and that proof spirit was almost universally of proper strength. It used sometimes to be said that half and half was about the mark. He thought it very probable that the discrepancy found in the results had largely arisen from the fact that tinctures were made from crude drugs, which were not originally up to the proper standard, or had deteriorated by keeping. It was an important question whether it was wise to introduce into the Pharmacopœia a test for each of the tinctures, but the descriptions of drugs were very distinctive, and if tests were included for those capable of assay, and if tinctures were carefully prepared only from crude drugs which came up to the standard, the tinctures ought to be nearly identical by whoever they were made.

Dr. MAHOMED (a medical visitor to the Conference) said he was surprised to find that tinctures differed so much, but there were some other points to be considered besides those referred to. He should be inclined, with all respect, to differ from the author when he said that the chief point was the alkaloidal standard, and that it did not matter so much about the extractives. Of course the alkaloids were exceedingly important, but they were not always the sole constituents of importance. For instance, in digitalis there were two alkaloids which were antagonistic to each other, and no benefit apparently accrued from prescribing digitalin; nearly the whole of the profession agreed in using the tincture, which included two alkaloids, one of which, to a great extent, counteracted the other. The really beneficial action of digitalis on the heart appeared, therefore, not to depend entirely on the alkaloid, but on something else. Accordingly, he considered that the great object in a tincture was to get as much as possible of the whole contents of the drug into the preparation. Manufacturing

chemists would tell you that their essence of beef, or bovril, contained the whole of the extractive matter of the meat; but any one who was hungry would much rather have a beef-steak than any quantity of bovril. It was the same in the case of wine, you could not provide an efficient substitute for the juice of the grape by means of ether, alcohol, and cream of tartar. He would suggest whether it would not be possible in the new Pharmacopœia to take as a basis a known quantity of the crude drug, say belladonna leaves or digitalis, prescribe the process, which is best for getting out the whole of the contents, and then standardise the tincture. All tinctures ought to be of the same strength, for it was impossible to make much clinical advance in medicine while they were so different. On looking through the Pharmacopœia he found that tincture of valerian was 1 in 20, belladonna 1 in 8, and nux vomica was to be so prepared that one ounce of the tincture represented a grain of the alkaloids. He did not see that they benefited much by knowing that one ounce represented one grain, unless they were all the same, so that a comparison could be made of the action of different drugs on a sound basis. Digitalis and strophanthus were very similar in their action, but they were made of such different strengths that a comparison was very difficult to make. If they were of the same strength, a known quantity could be injected, and the results watched by the sphygmograph and recorded, and you might say the action of digitalis and strophanthus on the heart may be represented as 5 to 7, or something of that sort, and that would be a distinct advance for medical purposes. Of course the doses would all be altered, but that would be a minor matter.

Mr. S. R. ATKINS said the question here raised was an interesting one, and showed the difference between analysis and synthesis. They were now familiar with the fact that you might analyse a substance and might then attempt to synthesise it, and the results might be totally different. To take a familiar illustration, you might desire to produce sea water, and might combine the ingredients found in it by analysis, but the result, as regarded the preservation or maintenance of life, was very different from the natural product. The fact was that in the great laboratory of Nature there were forces and principles at work which were exceedingly obscure, such as electricity or magnetism, which materially influenced the result. Some years ago, at one of the Conferences, he remembered an old member, who had now gone over to the majority, after listening to a long, and to him intensely

dry, discussion on the nature and variety of the alkaloids in bark, saying that he much preferred a drop of Huxham's tincture of bark to all the alkaloids.

The PRESIDENT said they were much indebted to Dr. Mahomed for his interesting remarks, but he feared the Pharmacopœia Committee of the General Medical Council would scarcely entertain the idea of pharmacists making physiological experiments. They must approach the question from the chemical and pharmaceutical side and determine the amount of extractive and alkaloid in the various tinctures. It was quite true that the amount of alkaloid present was not always a measure of the value of a tincture in the treatment of disease, but still it was a practical standard, and in some cases it was the standard by which they were able to estimate the relative strength and value of the bark from which the tincture was made. Notwithstanding the last Pharmacopœia discarded the old-fashioned pale bark and inserted a compound tincture of bark made from the red species, many medical men in cases of anæmia attached great value to the old-fashioned tincture. Whatever they contained, the tinctures of the Pharmacopœia should be as uniform in strength and value as chemistry and pharmacy could make them. They were much indebted to the authors of this paper, and he hoped they would continue their investigations.

Mr. RANSOM pointed out that one of the samples, which was especially mentioned as not up to the standard, and showed a small percentage of alkaloid, also showed a very small percentage of extractive. On the whole, he thought that though the tinctures were not absolutely uniform, there was a nearer approach to uniformity than if no standardised tinctures had been introduced.

Mr. J. C. UMNEY said the interesting point about this paper to a manufacturing pharmacist was the bad result of tinctures made from standardised drugs. In the case of cinchona and opium the solvent used for standardisation or assay of the particular drug was not the same as that used for making the tincture, and in the case of opium, at any rate, this might be one reason for the discrepant results.

Mr. BIRD remarked that in the case of tincture of opium the average result was about 75 per cent. of alkaloid, whilst the authors showed some time ago that by following out the B.P. process the average yield was only a little over 5 per cent. This would seem to indicate that manufacturers and pharmacists had departed from the Pharmacopœia instructions, either by altering

the process or by using opium above the standard fixed in the Pharmacopœia.

Mr. FARR, in reply, said their experience, as a rule, had been that when the drugs were of good quality and were kept carefully, the deterioration in any reasonable time was practically *nil*. In several instances, drugs which were examined some years since had recently been examined again, and practically no change had occurred. Of course, if the drugs were allowed to get damp, they would naturally spoil. With reference to the remarks made by the medical gentleman as to the comparative value of the alkaloids and extractives, he thought the example he gave—*digitalis*—was rather an unfortunate one, because *digitalis* had not been in any way worked out yet. In commerce you had digitalin, and also pure digitalin. Now the digitalin of the old Pharmacopœia was not by any means so powerful as what was known as pure digitalin of more recent make. The most recent researches showed that the *digitalinum purum* of the German makers contained only about 5 per cent. of real digitalin. These results had only recently been published, and of course they were astonishing. The same could not be urged in the case of many of these tinctures; for instance, in tincture of hemlock the alkaloid varied from .010 to .210, but the extractive in the latter case was very little different from the other. He could not conceive any one saying that those tinctures could possibly be of the same therapeutical value. The one represented the drug in its most powerful condition, the other was made from fruit that had become ripe, and had gradually lost all of its original alkaloid except a very small portion. The one would have full therapeutical effect; the other might be taken in doses of several ounces at a time without any effect whatever. That was an extreme case, but it could not be denied that the alkaloidal bodies present—at any rate where there was one principal alkaloid—were the principal therapeutic agents. The mere inert extractive matters varied probably according to the conditions under which the drugs were gathered. At certain seasons you found the crop of various drugs was very inferior to what it was at other seasons. One gentleman sent him two samples of tinctures of henbane, one made from new leaves of last year's growth, the other from a sample of leaves which had been in stock for twelve months, which he thought were not really fit for use. The one which had been kept twelve months, having been gathered in 1893, was more powerful than the fresh one, not to a large extent, but it contained more extractive, and also more alkaloid.

Of course, this was owing to the exceptionally dry season and the large amount of sunshine in 1893, and probably the same result would be found this year. With regard to the sample of tincture of *nux vomica* referred to by Mr. Ransom, which was particularly low, that was not made from extract at all, but from the original drug; it was quite different in colour to those made from extract. With reference to the others, he did not think it must be assumed that alkaloidal value meant actual strength. As far as he was aware, in the evaporation of the extract of *nux vomica* there was a certain loss of alcohol, and the estimation of the original percolate would not always correspond with the estimation of the extract made from it. There might be a loss of some of the brucine present—it was scarcely likely to be strychnine—and as that was much less powerful in action than strychnine, the loss in effect would not be equal to the loss in actual alkaloid. He agreed with Mr. Umney as to the use of standardised drugs, that they did not produce the effect desired. Mr. Wright and himself had always maintained that the preparation of tinctures from standardised drugs was not enough; the tincture must also be standardised after it was made. With regard to the tincture of opium, if you took powdered opium containing the proper percentage, viz., 10 per cent. of the alkaloid, the tincture made from it according to the British Pharmacopœia process would not contain '75, but from '5 to '6 per cent. of morphine. In the present case, two or three of the tinctures were not made from powdered opium; in one instance they were told it was not, and in two others the character of the tincture seemed to show that it had been made from moist opium; it was lighter in colour, and on evaporation there was more of the characteristic smell of opium than from the powder. Furthermore, in the estimation the alkaloid came out a little more freely, and all seemed to point to their being made from moist opium.

Messrs. Farr and Wright were thanked for their valuable communication.

The Conference then adjourned for luncheon.

The next paper was read by Mr. Parry, entitled :—

COD-LIVER OIL CONSTANTS.

By E. J. PARRY, B.Sc., F.C.S., AND C. E. SAGE, Ph.C.

The published constants of cod-liver oil are so varying that we thought it would not be without interest and value to obtain a number of samples of whose authenticity we were assured, and determine some of their most useful analytical figures. We obtained, therefore, ten samples, all of undoubted purity, and the figures which we have obtained for them are here compared with those already published by other observers. Our object has in no way been to discuss the detection of any of the numerous adulterants of this oil, but merely to see whether the results of the examination of these ten samples would show such large variations as have been recorded by various other observers, or whether the limits would appear to be more confined.

Specific Gravity.—The specific gravity at 15.5° C. has been recorded by various chemists at from .9220–.931. Allen originally gave .925–.931, but later gave .923–.930. The samples we have examined gave the following figures :—

1 . . . . .	.9227
2 . . . . .	.9240
3 . . . . .	.9274
4 . . . . .	.9281
5 . . . . .	.9285
6 . . . . .	.9286
7 . . . . .	.9286
8 . . . . .	.9286
9 . . . . .	.9288
10 . . . . .	.9291

which are included in the limits of .9227 to .9291.

Saponification Figures.—The figures published by previous observers here vary very widely. The actual percentage of potassium hydroxide necessary to saponify the oil is the most useful way of expressing this result, and we therefore quote the various figures recorded by this method. Allen originally gave the limits of 18.5 per cent. to 21.3 per cent., but later reduced them to 18.2 per cent. to 18.7 per cent.; Valenta gives 21.32; Kremel gives 17.1 to 18.9; while Thomson gives 18.51 to 18.82. In some of these cases it is probable that only a very few samples were examined, hence the narrow and different limits. Our samples yielded the following results :—

1	.	.	.	.	.	.	19.34 per cent.
2	.	.	.	.	.	.	18.57 "
3	.	.	.	.	.	.	18.03 "
4	.	.	.	.	.	.	19.10 "
5	.	.	.	.	.	.	18.34 "
6	.	.	.	.	.	.	18.49 "
7	.	.	.	.	.	.	18.45 "
8	.	.	.	.	.	.	18.97 "
9	.	.	.	.	.	.	18.34 "
10	.	.	.	.	.	.	17.90 "

which are included in the limits 17.90 to 19.34 per cent. of KO H.

Iodine Absorption Figures.—These are, perhaps, the most discordant results of any. In nearly all cases the published results are undoubtedly too low. This is in the earlier cases due to the fact that sufficient excess of iodine solution was not employed, or the absorption was not allowed to go on for a sufficient length of time. Kremel quotes 123 to 141 per cent.; Dieterich gives 139.6 to 152.6; Fahrion gives 147.9; Lewkowitsch gives 141 to 143.4; Allen gives in his commercial analysis 129.5 to 137.6, although he doubtless would give higher figures now; Thomson and Ballantyne give 158.7 to 166.6. We have no hesitation in saying that all these figures are distinctly too low, with the exception of the last quoted. The ten samples we have examined gave the following results:—

1	.	.	.	.	.	.	154.4 per cent.
2	.	.	.	.	.	.	155.3 "
3	.	.	.	.	.	.	162.2 "
4	.	.	.	.	.	.	156.0 "
5	.	.	.	.	.	.	159.2 "
6	.	.	.	.	.	.	162.7 "
7	.	.	.	.	.	.	154.7 "
8	.	.	.	.	.	.	153.5 "
9	.	.	.	.	.	.	168.4 "
10	.	.	.	.	.	.	166.4 "

These figures are included in the limits 153.5 to 168.4 per cent., confirming the results obtained by Thomson and Ballantyne.

Free Acids.—The amount of free fatty acids calculated as oleic, is, of course, not to be described under the term constant, but we have determined the amount in six of the samples, and quote the figures here.

2	.	.	.	.	.	.	.	0.60 per cent.
3	.	.	.	.	.	.	.	0.54 „
5	.	.	.	.	.	.	.	0.52 „
6	.	.	.	.	.	.	.	0.34 „
9	.	.	.	.	.	.	.	0.41 „
10	.	.	.	.	.	.	.	0.54 „

Melting Points of the Fatty Acids.—The characters of the fatty acids obtained by saponifying the oil and decomposing the resulting soap, are important factors in oil analysis. The melting points are not the least important of these. Very few figures for these appear to have been published. Our results are as follow :—

1	.	.	.	.	.	.	.	25° C.
2	.	.	.	.	.	.	.	23° C.
3	.	.	.	.	.	.	.	21.5° C.
4	.	.	.	.	.	.	.	22° C.
5	.	.	.	.	.	.	.	21.5° C.
6	.	.	.	.	.	.	.	24.5° C.
7	.	.	.	.	.	.	.	23.5° C.
8	.	.	.	.	.	.	.	22° C.
9	.	.	.	.	.	.	.	—
10	.	.	.	.	.	.	.	24° C.

that is from 21.5 to 25° C.

Iodine Absorption of the Fatty Acids.—The iodine absorptions of the fatty acids are, of course, higher than those of the original oil ; but the figures do not as a rule agree with those calculated from the quantity of fatty acids contained in the oil. This is due, in all probability, to the fact that during the drying, etc., of the fatty acids, oxidation or other changes take place, and the result is that the iodine numbers for the fatty acids often only very slightly exceed those for the original oils. Four samples gave the following figures for the iodine absorptions of the fatty acids :—

3	.	.	.	.	.	.	.	164.9
5	.	.	.	.	.	.	.	170.0
6	.	.	.	.	.	.	.	168.3
10	.	.	.	.	.	.	.	170.1

The question of limits to these figures is not of material importance, as they necessarily depend on those of the iodine absorptions of the original oils. It will be noticed that the samples of which we determined the fatty acid iodine numbers were those of the highest absorption. The other samples would most probably have been correspondingly lower.

Mean Molecular Weight of Fatty Acids.—This figure was determined in the ordinary way by estimating the amount of potassium necessary to form a neutral salt with a given quantity of the mixed acids. In four samples the figures were:—

3	288.2
5	292.5
6	288.6
10	287.6

or between 287.6 and 292.5.

We trust that these figures may prove of some little service as an additional series of observations on cod-liver oil, especially as they represent ten samples of oil of known purity. Had the samples been more numerous the figures might have shown even greater variations.

The authors were thanked for their very practical paper.

The next paper read was one on:—

OIL OF SCOTCH FIR (*PINUS SYLVESTRIS*), AND OTHER PINE OILS.

By JOHN C. UMNEY, F.C.S.

In a recent paper on the principal essential oils¹ I called attention to the great variation in the oils met with in trade under the name of ol. pini sylvestris, and stated that no single sample examined possessed the characters of the oil of the leaves of the true Scotch fir (*Pinus sylvestris*) as described by Bertram and Walbaum,² who distilled a small quantity of the oil for experimental purposes in the laboratory of Messrs. Schimmel and Co., of Leipzig. The terpene constituents of the oil have also been described by Tilden³ and Wallach.⁴ Since the time of my previous paper, having failed to obtain the oil in commerce, I distilled about 3 cwt. of the young leaves and cones of true Scotch fir (*Pinus sylvestris*, Linn.), collected by the kindness of Mr. E. M. Holmes, in the neighbourhood of Sevenoaks, in June last. The material was crushed and distilled with water, and yielded less than $\frac{1}{2}$ per cent. of essential oil, of a pale greenish yellow colour. The odour of the oil is highly characteristic, and the taste distinctly recalls that of blackberries.

¹ *Pharmaceutical Journal* [3], xxv., pp. 946, 977, 1039.

² *Archiv der Pharmacie*, 1893, p. 290.

³ *Ph. J.* [3], viii., 539.

⁴ *Ph. J.*, xix., p. 61.

The preliminary physical examination of this oil showed marked deviation in one respect from the sample distilled by Bertram and Walbaum already referred to, being *lævo*-rotatory (-19), whilst the latter was *dextro*-rotatory ($+10$). The specific gravity of the oil was $\cdot 8855$ at 15° C., that distilled by Bertram and Walbaum being $\cdot 886$.

Fifty grammes of the oil was fractionated from a glycerin bath, and yielded the following percentages boiling between :—

157-167° C.	8 per cent.
167-177° C.	27 " "
177-187° C.	20 " "
187-197° C.	3 " "
197-240° C.	7 " "
240-252° C.	6 " "
Residue	29 " "

It will be noted that the proportion boiling below 167° C., consisting principally of pinene, is very small, while a very large percentage distils above 197° C., in direct opposition to the results obtained by fractionation of very many of the turpentine adulterated oils sold as "*ol. pini sylvestris*," many of which yield 60 to 70 per cent. boiling below 167° C.

Reference was made in the previous paper on essential oils to the estimation of the ester-content of these oils expressed in terms of bornyl-acetate, which is stated to be the odorous constituent of many, if not all, the oils of *pinus*, *abies*, etc. The amount of ester indicated by this saponification process was 3.5 per cent., calculated as bornyl-acetate.

In order to free the oil from esters, which by decomposition during distillation might hinder the separation by fractionation of the various terpenes present, 50 grammes of the oil was saponified with alcoholic potash, thoroughly washed, dried with chloride of calcium, and distilled over sodium. By repeated fractionation the following fractions were obtained :—

157-162° C.	10 per cent.
162-165° C.	22 " "
165-171° C.	25 " "
171-175° C.	13 " "
Residue	30 " "

The fraction boiling from 157 to 162° C. had a sp. gr. of $\cdot 8552$ at 15° C., was *lævo*-rotatory to the extent of -13 in a 100 Mm. tube, and possessed all the properties of *lævo*-pinene. It is

noteworthy that Bertram and Walbaum obtained from the oil, distilled by them from material collected in December, dextro-pinene, this being the principal constituent by which the rotation of the oil is affected, whilst the oil examined by Tilden was also dextro-rotatory.

The fraction boiling from 165° to 171° C. possessed a sp. gr. of 0.8518 at 15° C., but gave no indication of phellandrene by the nitrite test, and was also inactive optically. The fraction boiling from 171° to 175° C. was dextro-rotatory to the extent of +0.75, had a sp. gr. of 0.8518 at 15° C., and corresponded in its principal characters with dipentene. The reaction which Wallach has stated to be characteristic of sylvestrene (a terpene believed to exist in various pine oils), viz., that its solution in acetic anhydride gives a purple coloration with sulphuric acid, could not be obtained from any of these fractions, although the oil before saponification yielded this coloration without difficulty.

It seems possible, therefore, that the reaction may be due either to some other body present in the oil, such as abietic acid,¹ or that the treatment referred to causes a modification in the sylvestrene, even if it be originally present.

It was found extremely difficult to separate the alcoholic constituent, the ester or esters of which appear to give the characteristic odour to the oil, owing to the small proportion existing therein,—several characters, however, point to the fact that the alcohol is not wholly borneol.

In order to compare the characters of bornylacetate or the other esters present in this class of oils, a considerable quantity of the oil of spruce (*Abies canadensis*) was treated with alcoholic potash, as already described, 29.4 per cent. of ester being indicated.

The saponified oil possessed the characteristic camphoraceous odour of borneol, and yielded on distillation a considerable quantity of that body. The fraction distilling above 200° C. solidified immediately in the condensation tube, precisely as in the fractionation of many samples of English rosemary oil, and melted at 206° C., the melting point of borneol. The saponified oil of *P. sylvestris*, however, does not possess the odour of borneol, but distinctly recalls that of *Artemisia abrotanum* (southern-wood). It yielded on fractionation no portion boiling above 200° C., neither could any indication of borneol be obtained. The acid obtained from the saponification of the oil appeared to contain

¹ *Journ. Chem. Soc.*, July, 1895, abs., p. 384.

valerianic or iso-valerianic in addition to acetic acid, but the quantity at my disposal was too small to make its separation and identification possible.

It may be gathered from these results that (1) the rotation of true oil of Scotch fir may differ, either according to the period of the year at which the material for distillation has been collected, or to the conditions of climate and soil under which the fir has grown; although it should not exceed 20° in either direction in a 100 Mm. tube. (2) That the specific gravity of the oil should not fall below $\cdot 880$ at 15° C. (3) That a very considerable portion should distill above 185° C. (4) That not more than 15 per cent. should distill below 170° C.

If, moreover, the new edition of the British Pharmacopœia includes this oil, then these or similar stringent characters and tests must be framed, which will ensure the user obtaining the true oil, even if at very considerably advanced prices as compared with those now ruling for the substituted oils.

OTHER PINE OILS.

In the course of the examination of the true oil of *pinus sylvestris* it has been found necessary to experiment with the oils distilled from various species of *Pinus* and *Abies* in order to characterise more especially their ester constituents.

The oil of *Abies canadensis*—spruce oil—has already been referred to as containing a very large proportion of the acetic ester of borneol, although its odour is quite different to that characteristic of the oil of Scotch fir.

The oil examined has a sp. gr. of $\cdot 9026$ at 15° C. and a rotation of -25 in a tube of 100 Mm.

By fractionation the following percentages were obtained:—

Below 165° C.	. . . . .	29 per cent.
165– 177° C.	. . . . .	22 „ „
177– 185° C.	. . . . .	14 „ „
185– 215° C.	. . . . .	29 „ „
Residue	. . . . .	6 „ „

The oil indicated by the saponification process, 29·4 per cent. of ester, calculated as bornyl-acetate, and by fractionating another portion of the saponified oil, a considerable quantity of borneol was obtained between 200 – 210° C., which solidified in the condensation tube as already described.

The acid separated from the saponified oil was proved to be acetic acid by the analysis of its silver salt.

The oil gave no indication of sylvestrene by Wallach's reaction, either before or after saponification.

These results agree closely with those obtained by Bertram and Walbaum (*loc. cit.*), with the exception that the sp. gr. of this sample is lower and its rotation slightly greater.

The oil of the young cones of *Abies excelsa* has already been referred to by me (*loc. cit.*) as being the one now frequently offered as "genuine pine-needle oil."

Its characters, however, distinguish it readily from the true oil for which it is substituted. It is much lower in sp. gr., usually from '855 to '865 at 15° C., and is lævo-rotatory to the extent of about -70 in a 100 Mm. tube. A sample submitted to fractionation yielded the following percentages, lævo-limonene (b. p. 173° C.) constituting a very considerable proportion of the oil:—

Below 165° C.	. . . . .	2 per cent.
165-175° C.	. . . . .	71 " "
175-200° C.	. . . . .	14 " "
Residue	. . . . .	10 " "

It indicated 2·1 per cent. of ester by the saponification process, but after such treatment no borneol could be obtained from the oil by fractionation.

A small quantity of the oil of *Picea vulgaris* has been distilled specially for me in Germany and possessed in my opinion the most pleasant odour of all the pine oils examined, somewhat similar, however, to that of *Pinus sylvestris*. It was yellowish in colour, had a sp. gr. of '8806 and an optical rotation of -37 in a tube of 100 Mm.

It yielded the following percentages on fractionation:—

163-173° C.	. . . . .	41 per cent.
173-176° C.	. . . . .	16 " "
176-185° C.	. . . . .	13 " "
185-220° C.	. . . . .	14 " "
Residue	. . . . .	16 " "

The ester content determined by the saponification process was found to be 9·8 per cent., no difficulty being experienced in obtaining borneol from the saponified oil from the fraction boiling above 200° C. The first and second fractions afforded distinct evidence of phellandrene by the nitrite test.

The oil of *Pinus pumilio* (mountain pine), as met with in trade, possesses fairly constant characters, and examination has been made of many samples, the specific gravities of all of which fall

between '865 and '870 at 15° C., or somewhat lower than the sp. gr., viz., '871 at 17.5° C., recorded by Bertram and Walbaum.

A sample of the oil selected for examination possesses the following characters:—Sp. gr. at 15° C., '8694. Optical rotation in a tube of 100 Mm. at about 15° C., -7.5.

Two hundred and fifty grammes of the oil was repeatedly refractionated from a glycerin bath, and yielded the following percentages:—

	Per cent.
Boiling between (1) 155-165° C. . . .	2
(2) 165-180° C. . . .	59
(3) 180-200° C. . . .	21
(4) above 200° C. . . .	18

This oil yielded 6.4 per cent. of ester by the saponification process, but by distillation of the saponified oil no fraction could be separated boiling above 196° C., and no precise indication of borneol obtained.

Mr. E. M. HOLMES said there had been for some years a genuine specimen of the oil of *Pinus sylvestris* in the Museum; one of his reasons for thinking it was genuine, was that some years ago, when in Bournemouth, he tasted some of the leaves of the tree, and found they had the peculiar blackberry taste Mr. Umney spoke of. Since then a number of people had seen the specimen in the Museum, and did not recognise it, and thought there must be some mistake about it; but the reason, no doubt, was that the article in commerce was not, as a rule, the oil of *P. sylvestris* at all. On this account he asked Mr. Umney to look into the matter and see whether oil of *P. sylvestris* could not be made as pure as the *pumilio* oil. He had brought specimens of the *P. sylvestris* and *P. maritima* with him; they were very much alike at a distance, and as the two were commonly grown together, it occurred to him that possibly they had been mixed when the leaves were distilled for the oil. The Scotch fir might be recognized by the short cones and the reddish-brown bark; the bark of the other was grey right up to the top, its leaves were longer, and its cones larger and in clusters. He was under the impression that the oil of commerce was obtained in the manufacture of wood pulp for paper; on distilling the residue, an oil came over, which he understood was sold as that of *P. sylvestris*. He was glad the matter had been looked into, because when a product which had a

pleasant odour like the oil of *P. sylvestris* was once brought into notice, physicians ordered it, and then after a time it fell into disuse simply because an inferior article was substituted. It was important, therefore, to have a standard, and he hoped this paper would receive consideration from the framers of the new Pharmacopœia.

Mr. W. A. H. NAYLOR said some years ago a very fine specimen of the oil of *P. sylvestris* was shown him by Mr. Bullock, who interested himself very much in the question, and went over to Germany to see the pine needles gathered and distilled, and brought back specimens of the oil with him that they might be tried by Sir Morell Mackenzie, and it was that gentleman's recommendation which led to its introduction into the Throat Hospital Pharmacopœia. He was unable to detect any resemblance to a blackberry aroma in that oil. He should like to know whether oil obtained from Germany, which was known to be genuine, was very similar, not only in specific gravity or rotatory power, but in general physical characters and taste. It had been known for some time that this oil had been very much adulterated, and possibly the one most in vogue to-day was the one which had a taste of rosemary more than anything else.

Mr. J. C. UMNEY said it was finding such a difference in the oils distilled in Germany and in England which led him to write to Messrs. Schimmel, in whose laboratory the experiments were carried out, and they sent him the sample upon which they worked.

Mr. S. R. ATKINS said this investigation revealed a serious discrepancy between the commercial article and the theoretically correct article. There was also an important question as to what were the best conditions for the preservation of these oils, which were so liable to oxidation. Evidently if this oil had to be produced by the method described, the product would be costly, and the best means of preservation would be all the more important.

Mr. JOHN MOSS said there seemed to be a peculiar fitness in a paper like this being read at Bournemouth, where they were told that one of the chief attractions was that the atmosphere was saturated with pine oil; no doubt it was so, but he certainly had not noticed the peculiar aroma which he had been led to expect. This paper was one which contained instruction rather than matter for criticism, and they could only thank Mr. Umney for having settled some of the debateable points concerning these oils. Their

knowledge about all these essential oils seemed to be only at the beginning, and the more they were studied the more they seemed to require investigation. In this paper the author had started several important questions, which would take some time and many experiments to settle.

Mr. P. McEWAN said Mr. Naylor's remarks recalled to him a circumstance, which, bearing on Mr. Umney's statement, raised another question of considerable interest. He understood from the paper that the oil of *P. sylvestris* contained a fairly large amount of bornyl-acetate, and that the oil which they had been accustomed to call ol. pini sylvestris was really the oil of *Abies excelsa*, which contained a comparatively small amount of bornyl acetate. About sixteen years ago one of their regular customers in Dundee was a sister of Sir Morell Mackenzie, and it was mainly through her that a local physician took up the Throat Hospital inhalations, but she used to complain that the vapour of the oil of *P. sylvestris* which they gave her was not the same as she got in London. Presumably she had got it from Mr. Bullock, and, of course, that was a totally different article. Now the therapeutic effect of oil of *P. sylvestris*, as generally used, seemed to be based upon the use of oil of *Abies excelsa*; therefore that oil was, apparently, a good therapeutic agent, and the question was whether they ought to replace it by the true oil.

Mr. W. JONES said, as an old assistant of Mr. Bullock's, he knew that the oil which was used at that time was quite different from the ordinary commercial oil of *P. sylvestris*. He should like to know why the change had taken place abroad and one oil had been discontinued on the market in favour of the other; there must be some reason for it.

Mr. HOLMES said a few days ago he was told by a chemist that he had examined a specimen of ol. pini sylvestris a few months previously and found it dextro-rotatory, and some time afterwards he found it lævo-rotatory. If that were actually the case, it would seem to show that the rotatory power of the oil was of no value as a test. It would be very interesting to know, from a chemical and physical point of view, whether such a change did take place, and when, and he hoped Mr. Umney would make some further experiments in that direction. With regard to the keeping of essential oils, his experience was that if kept in small bottles, quite full, and not exposed to light, they kept fairly well; it was also advisable to dry them with chloride of calcium to get rid of a small quantity of water which otherwise appeared at the

bottom of the bottle after exposure to a low temperature, and led to oxidation of the oil.

Mr. M. CONROY said the Conference was much indebted to Mr. Umney, who had shown how they had gone on using the wrong essential oil for years without knowing it. He did not know why the manufacturers substituted one kind for another, and feared it was not always substitution, but sometimes adulteration. Another important point which came out, was that too much reliance must not be placed on the rotation. No doubt the oil from Messrs. Schimmel was genuine, and yet its rotation was directly opposite to that of the oil distilled by Mr. Umney himself.

The PRESIDENT said this was an excellent paper, and it had evoked an interesting discussion, which was one of the benefits to be derived from such meetings. The essential oils of Pharmacopœia were almost the least satisfactory things the retail chemist had to handle. They were indebted to Mr. Umney, not only for this paper, but for a previous one, published in the *Pharmaceutical Journal*, which showed that he was doing a large amount of work on these oils, which would be of the highest value to pharmacy and medicine. It was rather disappointing to find that perfectly genuine oils varied so much that one had a dextro-rotatory power of 20° , whilst another had a lævo-rotatory power to the same extent, and this seemed to discredit the polarimeter altogether, though it had been hitherto regarded as a very important instrument in determining the constitution of such bodies.

Mr. J. C. UMNEY, in reply, said he had recognised the difficulty with reference to the optical indications by stating that the oil might be either dextro- or lævo-rotatory, although not strongly in either direction; the result of his own experience and that of the chief German chemists was that the other characters were quite sufficient to distinguish it from other oils and from turpentine. The specific gravity was $\cdot 885$, whilst that of oil of *Picea excelsa* was about $\cdot 863$, and sometimes as low as $\cdot 859$. The oil of *Picea* contained about 70 to 80 per cent. of limonene. He did not know until he came into the room that he had had an opportunity of examining the particular oil Mr. Holmes referred to. That oil when first examined was said to have a lævo-rotation of 10° ; it was put into his hands to examine, and he found some three or four months ago that it was then dextro-rotatory to the extent of only 1° , and since then it had not changed at all. Whether it had got to the end of its tether he did not know, but he was not

inclined to think that oil would change by keeping from dextro to lævo, or that it would even lose so much of its rotatory power. Reference had been made to the difficulty of preservation, and the same held good in the case of oils containing terpenes; oil of juniper berries, oil of savin, etc., were all subject to the same kind of change, which could only be avoided by keeping the bottles full, so as to keep the air from them, and seeing that they were free from water, as Mr. Holmes had pointed out. Mr. McEwan had referred to the percentage of bornyl-acetate, but he was not satisfied that that acetate was present in the true oil at all. The oil of *Abies canadensis* contained 30 per cent. of bornyl-acetate, and its aroma was quite different with regard to the oil upon which the reputation of this article was founded. No doubt a good deal of the oil of commerce was from *Picea excelsa*, but that only applied to about one-fifth, the other four-fifths was principally turpentine with a little acetic ether, and some with a little oil of *Pinus pumilio*. The difficulty which came in now at each step was the question of price. No doubt if stills could be put up in the neighbourhood of the materials, say, in the Sevenoaks district, the oil could be distilled cheaply. The oil of *Picea excelsa* cost 16s. or 17s. a lb., but pharmacists would not mind paying any price if they could get what they wanted, and he had brought the matter forward in the hope that they would be able to get what they wanted.

Mr. J. C. Murray was thanked for his communication.

Mr. John Moss then described:—

THE STILL ALARM.

BY N. CROSSLEY JONES AND P. W. JONES.

Those who are occupied in laboratories where distillation is going on from a number of stills are well aware, from, perhaps, repeated experiences, that without a tell-tale of some sort there will occasionally be an overflow from the receiver.

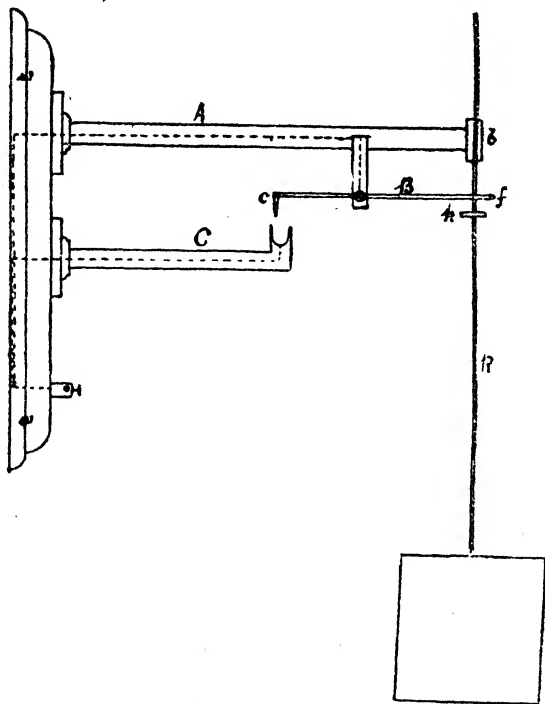
This arises in those numerous cases where the receiver is not large enough to take the whole of the distillate from one charge, and always means loss and other inconveniences.

In some instances a capacious receiver is not desirable, for one often wants to collect fractions apart. In others, the position of the condensing arrangement is such that only a small receiver is permissible.

Most receivers are made so as to protect the contents from

exposure, and being opaque, the difficulties and anxieties of the attendant, in connection with the danger of an overflow, are still further increased. He must have his eye on the distillate every few minutes, and a moment's forgetfulness, or miscalculation of the time that may be still allowed before changing the receiver, means overflow and loss.

This small apparatus not only obviates these disadvantages, but permits of further indirect saving, in that the attendant is at



THE STILL ALARM.¹

The float attached to the rod *R* dips into the receiver and, rising as the latter becomes full, causes the point *c* to dip into the mercury cup at the end of the arm *C*, so making contact and completing the electric circuit.

liberty to perform other work in perfect confidence that he will be called as soon as required.

Because the device has for nearly two years worked with abso-

¹ The block for this illustration was kindly lent by the Editor of the *Pharmaceutical Journal*.

lute and unfailing certainty in connection with the stills in Messrs. John Moss & Co.'s laboratories, the inventors have called it "The Still Alarm," and ventured to think that, though many alarms exist, this particular form and adaptation would be sufficiently interesting to show to the Conference. Other useful applications of the device are obvious.

The Still Alarm consists of a wooden slab (*vw*) carrying two arms, which are the terminals of an electric circuit. The upper arm (*A*) finishes in a bearing or guide (*b*) for the vertical float rod (*R*), and also supports a balanced bar (*B*), actuated at the forked end (*f*) by the float rod, so that when the latter is raised to a certain height the circuit is completed by the depression of the contact end of *B* into the mercury cup at the end of the lower arm *C*.

The alarm may be fixed in any convenient position, either upon the worm tub itself or, preferably, on a small movable stand, which may be raised when the receiver is full enough, and so give room for it to be exchanged.

When working, the float dips into the receiver, or any adjunct to it which special conditions may render desirable. As the distillate collects, the float, which has already been adjusted to the proper height, in rising actuates the bar *B* by means of a small flange *k*, and so making contact, a bell rings and continues ringing until the receiver is emptied.

Perhaps it is hardly necessary to point out that one bell and battery suffice for an indefinite number of alarms, each of which may be identified by means of one of the usual indexes.

One obvious application of the alarm is to vessels which are to be filled with liquid to a definite height or volume; as soon as the point is reached a bell rings, or by a slight elaboration of the arrangement the flow may be shut off. Should an objection appertain to copper as the material for the float, aluminium or glass may be substituted for it, and of course works well; for an acid still, celluloid and ebonite are equally serviceable. Skilled labour is not required, the adjustment being simply mechanical.

The PRESIDENT said he feared this paper did not lend itself to discussion, but they were much obliged to Mr. Moss for his demonstration.

Mr. ALCOCK asked if the alarm would be equally applicable to the evaporation of liquids, giving an alarm when they were reduced to a certain volume.

Mr. F. C. J. BIRD asked if it was adjustable. It struck him as an extremely useful piece of apparatus in the present day, when men had so many things to do at once. He knew an instance of a large factory where santal wood oil was distilled in large quantities, the stills being kept going night and day, and of course a man was employed to sit up all night to watch. One night, being overcome by the heat, the watchman went to sleep, and next morning it was found that 20 or 30 lbs. of material had gone into the sewer. Such an accident would have been prevented by the use of this ingenious apparatus.

Mr. MOSS said there would be no difficulty in applying this to the purpose indicated by Mr. Alcock. You would only want a lever, one end of which fell as the liquor evaporated, and the other end would rise and sound the alarm when the desired level was reached. It might be made adjustable in any direction without difficulty.

The next paper read was on:—

STERILISED SURGICAL DRESSINGS: A RECORD OF EXPERIENCE.

By EDMUND WHITE, B.Sc.

In vol. xxii. of the St. Thomas's Hospital Reports I published a communication upon sterilised surgical dressings, giving my experience in supplying these materials for general use in hospital practice. The arrangements I made were contrived so that a supply might be sent to any part of the hospital, and for any purpose, from the dispensary. This was done in order to obviate the necessity of specially sterilising the dressings for each individual operation.

The experience I have gained since the publication of the paper mentioned above has enabled me to modify and extend the observations contained therein.

In the first place I would suggest some modifications in the steriliser.

1. The introduction of a trap or condensed water box in the steam pipe leading from the boiler to the steriliser. This would prevent the water, which collects in the pipe, from being blown into the steriliser when the steam is first turned on.

2. A disc or plate with fine perforations should be placed over the orifice of the steam pipe where it enters the steriliser. This

secures the even distribution of the steam. If the orifice be left uncovered, the steam, entering the chamber in a jet, is apt to crack glass vessels with which it comes into contact.

In the details of the sterilisation I have been led to make the following modifications:—

1. The pressure is not allowed to rise higher than 10 to 15 lbs. to the square inch. The temperature corresponding to 20 lbs. pressure, at which I originally worked, has been found to have a destructive action on the dressing materials, making them rotten and slightly charring them.

2. When the dressings are *in situ* steam is turned on slowly, the tap at the bottom of the steriliser being left open to allow the air to be displaced by the specifically lighter steam entering at the top. When the air has been displaced, as shown by the escape of steam from the bottom tap, the latter is closed and the pressure allowed to rise to 10 lbs. Steam is then shut off and the bottom tap fully opened. The excess of steam then rushes out, carrying with it the bulk of the air not previously displaced. This operation, which occupies three to five minutes, is then repeated before sterilisation proper is commenced, and serves to secure a thoroughly moist atmosphere of steam.

With the precautions described in my previous paper, I have no difficulty in turning out the dressings in a satisfactory condition, free from obvious moisture, and giving excellent results in practical surgery.

With regard to the receptacles for holding the dressings; I have been forced, reluctantly, to give up the use of glass jars with which I originally commenced. The breakages were so numerous that I had to seek for some more durable material in spite of the obvious superiority of glass in every other respect. Nearly all the fractures in the glass occur when the vessels are removed from the steriliser to the comparatively cold external atmosphere, and not during the heating in the steriliser. The change of temperature in the latter case may be brought about gradually, by letting in the steam slowly at first, but when the vessels are removed at the end of the process the change is necessarily sudden.

I have tried the following materials in place of glass: zinc, copper, copper-tinned, copper nickel-plated, and aluminium, with the following results:—

Zinc suggested itself to me as a light and inexpensive material not liable to oxidation under ordinary conditions. In the steriliser,

however, the steam at the high temperature employed rapidly forms a coating of oxide or hydrato-oxide, which rubs off as a white powder on the dressings.

Copper vessels proved more durable, but they become black and unsightly, and occasionally stain the dressings blue.

Copper-tinned proved satisfactory to tin, being quite unaffected after many months of continual use.

Copper nickel-plated also answers well, but a good coating of nickel is necessary to prevent the copper stains after some time.

Aluminium proved the most satisfactory of all, the vessels being very light, and their appearance is quite unaltered by twelve months' continual use.

As a result of these experiments I now use copper-tinned vessels, the aluminium being too expensive on the large scale. The copper nickel-plated does not offer advantages over the copper-tinned commensurate with the increased cost of the former.

It has been found practicable to still employ glass lids with the copper-tinned vessels, the mortality among the lids being insignificant compared with that among the glass jars.

In addition to the cylindrical canisters measuring 8 by 4 inches, I have devised another receptacle of a larger size which is useful when a large quantity of material is required for several operations in succession. This consists of a copper-tinned box 10 inches long, 8 wide, and 6 high, provided with a hinged lid. On the inner surface of the lid, and running round all four sides, there is a groove into which the upper edge of the body fits when the lid is closed. This groove is filled with sterilised cotton wool when the vessel is removed from the steriliser, and consequently forms a germ-tight junction when shut. Fitting into this receptacle is a copper-tinned wire basket which receives the dressings to be treated. During sterilisation the basket is removed from the vessel, so that its contents may be exposed to steam on all sides. When the steriliser is opened, the basket is dropped into the outer vessel and the lid closed, as already described. I am now trying to find some material which may be permanently fitted into the lid in place of the cotton wool, which has to be arranged each time, but have not yet succeeded; all the materials I have tried have shrunk and become useless after being used a few times.

In conclusion, I should like to call your attention to a material which has proved very satisfactory as an aseptic dressing, and promises to become a very valuable addition to our dressing.

materials. It is a kind of cellulose wadding made by the disintegration of pine wood. It absorbs about the same amount of water as absorbent cotton, but its special value is that discharges absorbed by it are distributed more evenly throughout the bulk of the dressing, instead of running through at one spot as is the case with cotton wool.

The PRESIDENT said this was a very interesting paper. Sterilised dressings were now such an important part of the armamentarium of the surgeon that the chemist must supply them, and any suggestions which would improve them were of great value.

Mr. COLLIER said the dressings used at Gny's Hospital had for some time been sterilised, the apparatus used being very large, and employed for other purposes as well. Their method was very simple. The sister in each ward prepared the particular dressing and put it into a small bag made of brown holland and lined with gamgee tissue, which was securely tied. These bags were then placed inside another larger one, each ward having one of these bags, and they were brought to the dispensary, and from there taken to the steriliser, which was an apparatus as large as the boiler of a locomotive, and in it they not only sterilised the dressings but the surgeons' coats as well. Sponges were now but little used, softened cotton enclosed in a little bag of muslin being substituted, and these were all sterilised. The method described by Mr. White might be a very excellent one, but it appeared rather troublesome, whilst theirs was very simple and gave great satisfaction.

Mr. MOSS suggested that, if it were necessary to sterilise the surgeons' coats, it might be advisable also to sterilise the surgeons.

The PRESIDENT inquired if the cotton-wool with which the joint in the lid of the box was made was sterilised before being put in.

Mr. WHITE said it was.

Mr. M. CONROY said he had no experience in this matter, but he understood that in Mr. White's apparatus wet steam was employed, and in Mr. Collier's, dry steam, which seemed far more suitable.

Mr. COLLIER explained that his steriliser was a large cylinder into which steam at a very high pressure was admitted, and it had a steam jacket outside, by which the interior was dried after the steam was turned off.

Mr. WHITE said the point about this apparatus was that it was so simple. It could be used with steam from an ordinary boiler, and was always available when wanted. No outer jacket was needed. A pressure of 15 lbs. gave practically dry steam, as the temperature was above the boiling point of water. The articles came out quite dry to the hand, but about 5 per cent. of moisture could be driven off afterwards by putting them in a drying oven. He had tried to get as nearly as possible to the ideal, and though it might be satisfactory to use bags, it seemed to him that there was more liability to contamination in the transfer from the steriliser to the other parts of the hospital. Using vessels such as he had described, he should have no hesitation in using the dressings after six months, because the covers were quite germ-tight. The usual plan, which he gathered was followed at Guy's, was to run the steam in for a time, and then shut it off, and pass the steam round the outer jacket to drive off the steam from the interior. That was unnecessary with the precautions he had described.

Mr. ELBORNE said when he was at Nottingham some time ago, he went over the large new prison, where he saw a very large apparatus, which was used for sterilising the prisoners' clothes. It was quite a room, which you could walk round in, fitted with iron rods on which the clothes were hung. He thought there must be similar sterilisers in London. He had never had occasion to do anything of this kind, and he should like to ask whether aseptic dressings were preferred generally to antiseptic ones. At University College Hospital they preferred antiseptic. His difficulty was that one could have no positive evidence of the dressings being aseptic, because directly they were opened they were liable to contamination. It might be worth while for pharmacists to inspect these large receptacles which must be in use in most large prisons. The person in charge told him that the clothes came out absolutely dry, and that they were submitted to very great pressure.

Mr. WHITE said Mr. Elborne was quite correct; if he had looked he would have found steam pipes inside the chamber for drying off the clothes after they had been steamed. His apparatus consisted of one single chamber, with no coils or jackets, and it did not require an engineer to work it, but could be trusted to any labouring man. He might say that the younger surgeons for the most part supported the aseptic system, as they did on the Continent, and many would not use the Listerian system at all. Many young

surgeons went to the Continent to study, and came back imbued with a belief in the aseptic system, and it was with men of that class that they would probably have to deal in future. That was why he brought the matter forward.

The PRESIDENT said he could endorse what Mr. White said about the aseptic method being on the increase.

A vote of thanks was accorded to Mr. White for his paper.

The Conference then adjourned for the day.

Wednesday, July 31st.

The PRESIDENT took the chair at 10 a.m., and the business commenced with the reading of a paper entitled :—

THE WEIGHTS AND MEASURES OF THE BRITISH PHARMACOPŒIA *VERSUS* THE METRIC SYSTEM.

BY WILLIAM ELBORNE, B.A., F.L.S.

Pharmacist and Demonstrator of Materia Medica at University College Hospital.

A silent change is taking place, one which many of us are helping to bring about, and its issue will be rather of a revolutionary character; it is no less than the severance of the axis around which English pharmacy has for many years revolved. The grain, the scruple, the drachm, and the ounce, together with the Roman numerals, the ancient symbols of the prescription, the old masonic signs between prescriber and dispenser are ultimately to be done away with, and at last we Anglo-Saxons are to think and chatter in a foreign tongue. In the new circumlocution a plain 5-grain blue pill becomes pil. hydrarg. 0·324 gramme, or 3·24 decigrammes, or 32·4 centigrammes, or 324 milligrammes; and a 2-ounce black draught becomes mist. sennæ co., 56·794 cubic centimetres.

I allude to the recent memorandum issued by the Therapeutic Committee of the British Medical Association in reference to the approaching revision of the British Pharmacopœia: "The metric system of weights and measures should be introduced, the equivalent in avoirdupois weight and imperial measure being added as alternatives. In the Pharmacopœia for 1885 a great advance was made by the parts and fluid parts of the materials

used in galenica-compounds being given in many instances, as well as the weights and measures in grains and ounces. The principle then adopted might be still further extended. The general employment of the cubic centimetre for liquids, and the gramme for solids, as in the American (U.S.) Pharmacopœia, might with advantage be adopted."

Among the reasons assigned for the legislation or permissive use of the metric system in this country is primarily that its introduction would facilitate and be more advantageous to our foreign commerce, and the Select Committee of the House of Commons after having received evidence from witnesses representing many different interests, official, commercial, manufacturing, trade, educational and professional, have recommended as follows:—

(a) That the metric system of weights and measures be at once legalised for all purposes.

(b) That after the lapse of two years the metric system be rendered compulsory by Act of Parliament.

(c) That the metric system of weights and measures be taught in all public elementary schools as a necessary and integral part of arithmetic, and that decimals be introduced at an earlier period of the school curriculum than is the case at present.

Thus by the legislation or permissive use of the metric system having been obtained, there would be no impediment to its immediate introduction into our Pharmacopœia, and by donning this mantle of science it is considered that we should be progressing more with the times, and that our Pharmacopœia would thus assume a more imperial or even international character, or at least be more in harmony with the pharmacopœias of France, Germany, and the United States.

Now as regards the metric system, considered by itself, for ensuring international uniformity in matters of science, it is at once the most simple and excellent, and is voluntarily adopted by physicists and chemists of all nationalities, and, as we know, has been adopted by English pharmacists in their investigations and research for many years; it is also already and justly recognised in our Pharmacopœia in the preparation of our volumetric test solutions. At present, however, it is not, I fear, sufficiently well-known among us to warrant its sole adoption into the formulæ of our Pharmacopœia (which is not I understand intended at present, and of the evils attending its adoption in half measures I propose to speak further on), neither is the

successful experience attending its introduction into France and Germany (its native land) and into the United States Pharmacopœia, any strong argument for Englishmen.

Moreover our B.P. was never written primarily for the promotion of foreign commerce, but expressly for the safety of the public and ensuring uniformity in the daily distribution of medicine throughout the vast British Empire.

Now, however closely pharmacy may be allied to the exact sciences, we must never forget that the practice of medicine and pharmacy is essentially an art; and probably the whole root of the matter in reference to this sought-for change is that we have become, as it were, so fashionably intoxicated with the modern spirit of science that we are at last failing to discern the vested interests of our art; and, as in every noble edifice, the higher we rise in the superstructure the further we get away from the foundations; yet, however unconscious we may become of their presence, they nevertheless undoubtedly exist, deeply rooted in the soil. And while it is most desirable that in matters of science all measurements should be expressed in the metric system, yet at times it is well to be mindful that the arts of life existed long before science was dreamt of, and that a considerable portion of what science we know owes its origin to the interpretation of the arts. We should also distinguish that science, which has no vested interests to protect, and whose aspiration is ever to see the one in the many, and to merge technicalities and particulars into the general, possesses an unbounded privilege by no means aspired to in the arts, viz., of daily revising her standards, and welcoming any revolutionary measures of discovery with open arms.

Now if our pharmacopœial weights and measures (including the apothecaries' weights) were involved in any real defect or fundamental error, their abandonment would be justified. But such is not the case; in fact they are based on foundations a little more solid than those of the metric system, for they are what they were intended to be, whereas that cannot be said of the metric system, inasmuch as the metre, the base of the system, was intended to be the ten-millionth part of a quarter of the earth's meridian, which it is not. Apart from such philosophical trifling, one of the most valuable and characteristic features of the British system is that it is a convenient natural growth, and an inheritance eminently adapted by experience, that master of undoubted authority, for efficiently carrying on our busy art

in the shop, surgery, or dispensary. And the fluid grain is the measure of 1 grain of water.

The British legal standard of mass, called 1 lb. avoirdupois, is an arbitrary lump of platinum, and $1/7000$ part of it is called a grain (troy, avoirdupois, and apothecaries' grain), which latter, says Mr. Davies Gilbert, a former President of the Royal Society, "the College of Physicians have expressed themselves most anxious to preserve" (McCulloch's 'Dictionary of Commerce,' London, 1832, p. 1102). The avoirdupois ounce weighs 437.5 grains and the volume of 437.5 grains of water at 62° F. is called the fluid ounce.

On the other hand, the metric system, one of the results of the great French Revolution, introduced in 1799 and legally established in France in 1840, is eminently artificial; its standard of mass is a lump of platinum called the kilogramme, intended to have the same mass as a cubic decimetre of distilled water at 4° C. The lowest denomination of this standard is the milligramme, which is the millionth part of it, and 1,000 of such parts constitute the gramme. Confining our attention to the measurement of mass, the lowest denomination of our avoirdupois pound is the grain, and the great advantage of this unit for the purposes of medicine is that it is a quantity, as the word grain suggests, very small, yet readily comprehended, whereas the milligramme is a quantity so exceedingly small that it is almost imperceptible, and it is difficult to think in terms of it. We could, perhaps, form a better idea of it if we were to weigh out 1 grain of, say, *pilula hydrargyri* and imagine our small 1-grain pill equally sub-divided into sixty-five other very little pills; each of the latter would then weigh a milligramme. Our grain consequently equals 65 milligrammes, and this expressed in terms of the gramme is 0.065; and which is easier to think of, our original small pill in terms of 1 grain, or in terms of 65 milligrammes? And to arrive at *pil. hydrarg., gr. v.*, which is the easier calculation, to multiply 1 by 5, or 65 by 5, arriving at 0.325 Gm.? And for half a grain, which is easier to divide, 1 by 2 and write $\frac{1}{2}$, or to divide 65 by 2 and write it 0.032 Gm. or 3.2 centigrammes or 32 milligrammes? But suppose a slight error be made in the insertion of the decimal point, is the mistake so readily discoverable as in our British system? The dose of morphine, for instance, is, say, $\frac{1}{2}$ grain (0.032 Gm.), but if by mistake it were written 0.32 Gm., would the error be so patent as in its English dress, *gr. v.*? Here is a case in which 1,000

times the quantity of atropine ordered was dispensed in mistake :
 "A fatal case of poisoning is reported from the United States, as having occurred in Brooklyn through a dispenser mis-reading the following prescription :

Atropin sulphurici	1.5 mg.
Aquæ	30.0 Gm.

M. S. As directed.

Misled by the unusual way in which the dose of atropine was written, the dispenser read it as 1.5 grammes, and dispensed the solution accordingly; in extenuation it was urged that the dose should have been written 0.0015 Gm. . . . We may remark that a confusion similar in nature to that obtaining in the dispenser's mind, though perhaps not to the same degree, may be met with not unfrequently in the literature of countries where the metric system has been used longer than in the United States." (*Pharm. Journ.* [3], vol. xv., p. 901). Some of us will perhaps wonder what this has to do with the application of the metric system to the B.P.; all I can say is that by its introduction will not metric prescribing and possibly this sort of evil necessarily follow?

Now the consistency of the French in the use of their metric system is due to the absence of the cubic centimetre from their pharmacopœial formulæ (in the Supplement of the Codex recently issued, the measuring of liquids for alkaloidal solutions has been adopted), all their pharmacopœial preparations being prepared by weighing and likewise dispensed by weight in grammes. In consequence, percentage solutions are regarded in terms of weight, and a 5 per cent. solution of, say, camphor, in alcohol specific gravity 838 would mean 5 grammes of camphor dissolved in 95 grammes of alcohol; but the spirit alone would measure about 113 cubic centimetres, and herein lies the crux of international discord regarding so simple a matter as percentage solution, for we English who just as consistently prepare and dispense all our liquid medicines by measure, regard a 5 per cent. solution (of a solid) by weight in measure, as for instance grains in fluid grains, whatever be the solvent. And instead of in grains and fluid grains, to express it as grammes in cubic centimetres is practically one and the same thing, for disregarding temperature, the gramme is 15.432 grains, and the cubic centimetre is another name for the fluid gramme. But for prescribers and dispensers—the people who chiefly use the *Pharmacopœia*—this expression

of a percentage solution in grains and fluid grains is not exactly what is wanted; what we want to know is, regardless of the grain measure not being a minim, how many grains of an alkaloid or what not there are in 100 minims of the solution, and since all medicines are prescribed by measure, that is, I believe, a prescriber's view of a percentage solution.

And if grains and fluid grains be unsatisfactory, so likewise must grammes and cubic centimetres, for I have already shown that they are in the end the same thing, and, in fact, in our pharmacopœial volumetric test solutions they are accepted as such. And if grains and fluid grains are not so well understood, as I find to be the case among dispensers, how shall they more readily comprehend these foreign multiples of them? Moreover, it is this difference of opinion respecting the constitution of a percentage solution which renders futile the endeavours at an International Pharmacopœia, and grammes and cubic centimetres will not help us out of the difficulty. Let us, however, imagine our aspirations realised, and the metric system introduced into the Pharmacopœia in accordance with the recommendation of the Therapeutic Committee above mentioned. First, a word in reference to the term cubic centimetre. Has it occurred to us that it is not a denomination at all of the metric liquid measure (the litre), but that it belongs to the metric cubic measure, intended for measuring masonry and timber, which by popular perversity, sanctioned by custom, is used instead of the "millilitre"? To speak of our fluid ounces in terms of cubic centi-yards would be an expression somewhat analogous; the precise metric system, we see, starts off in an anomaly.

Here is *extractum cinchonæ liquidum*, our own weights and measures in precedence, with the alternative metric weights and measures (grammes and cubic centimetres).

Extractum Cinchonæ Liquidum.

Take of

Red cinchona bark, in No. 60 powder .	20 ozs.	566.99 Gm.
Hydrochloric acid	5 fl. drms.	17.75 C.c.
Glycerin	2½ fl. ozs.	70.9925 C.c.
Rectified spirit } of each a sufficiency.		
Distilled water }		

Mix the bark with five pints (2839.66 C.c.) of the water to which the acid and the glycerin have been added, and macerate in a covered vessel for forty-eight hours, stirring frequently; then transfer to a percolator, and when the fluid ceases to pass, and the

contents of the percolator have been properly packed, continue the percolation with water until fifteen pints (8518·98 C.c.) of liquid have passed, or that which is passing has ceased to give a precipitate on the addition to it of an excess of solution of soda. Evaporate the percolated liquid in a porcelain or enamelled iron vessel at a temperature not exceeding 180° F. (82°·2 C.) until it is reduced to 20 fluid ounces (567·94 C.c.).

Put 50 fluid grains of this liquid (3·245 C.c.) (a) with half an ounce (14·198 C.c.) of distilled water into a stoppered glass separator capable of holding 4 fluid ounces (113·588 C.c.); add to this 1 fluid ounce (28·397 C.c.) of benzolated amylic alcohol and half a fluid ounce (14·198 C.c.) of solution of soda, shake them together thoroughly and repeatedly, then allow them to remain at rest until the spirituous solution of the alkaloids shall have separated and formed a distinct stratum over the dark-coloured alkaline solution of the other constituents of the extract. Run off the latter by the stop-cock, add a little more distilled water to wash away any still adhering alkaline solution from the separator and its contents, and having run off this as before, as completely as possible, decant the spirituous solution into a small porcelain or glass dish the weight of which is known. Evaporate by the heat of a water bath until a perfectly dry residue is left. The weight now of the dish and its contents, after deducting the known weight of the dish, will give that of the alkaloids, and this (in grains) multiplied by 2 will give the parts by weight of the alkaloids in 100 fluid parts of the liquid (a). (Or, the residue in grammes multiplied by 30·76 will give the weight of alkaloids in grammes per 100 C.c. of the liquid.)

Having thus ascertained the alkaloidal strength of the liquid (a) every fluid part of it (in grains or C.c.) containing 5 grains (0·325 Gm.) of total alkaloids is first to be brought to the volume of 85 (5·5 C.c.) grains by evaporation, or if necessary by dilution with water, then 125 fluid grains (0·78 C.c.) of rectified spirit are to be added, and the final adjustment of the volume to 100 fluid grains (6·5 C.c.) is to be effected by the addition of distilled water. The finished liquid extract will thus contain 5 grains (or grammes) of the alkaloids of the bark in every 100 fluid grains (or cubic centimetres).

Dose—5 to 10 minims (0·059 to 0·59 C.c.).

Here is an array of numbers; and if the above performance is in any way typical of what we are to get, I know of nothing more likely to bring the simplicity of the metric system into disrepute.

It must evidently be adopted solely, or not at all; and if adopted in these half-measures, there will be a tendency to round off the above decimals to approximate numbers, as formerly done in the Codex, and more recently in the sixth revision of the United States Pharmacopœia (as shown below), resulting, doubtless, in all kinds of subsequent discussion from wranglers and "half-minim" hunters, that such a noble instrument of precision should be thus mauled. Here are examples of the rounded-off system from the U.S.P. (sixth revision, 1883):—

Trochisci Magnesie.

	Grains.	Grammes.
Magnesia	300	19·50
Nutmeg	15	1·00
Sugar	900	58·50
Mucilage of tragacanth, a sufficient quantity.		
(For 100 troches.)		

Trochisci Morphine et Ipecacuanhæ.

	Grains.	Grammes.
Sulphate of morphine	5	0·32
Ipecac. powder	16	1·00
Sugar	2000	130·00
Oil of gaultheria	2	0·13
Mucilage of tragacanth, a sufficient quantity.		
(For 200 troches.)		

Another aspect of the question bearing upon the introduction of these centigrammes and milligrammes for dispensing purposes is. How shall we weigh them? Is the balance we are accustomed to see in a glass case to supplant our dispensing hand-scales—the busy instrument which, like the mortar, being so essential to the daily performance of our art, was conspicuously enshrined as a sacred emblem in our coat of arms?

Times may have changed, and the question is not new; and this is Jacob Bell's opinion of the subject:—He said, "he was not so enthusiastic as some persons appeared to be in favour of an alteration of our weights and measures to the decimal system. He was quite sensible to the existing evil, . . . but would prefer reform to revolution." And the opinion of the late Professor Redwood is doubtless embodied in the following quotation from the preface to the British Pharmacopœia of 1867, which is as true to-day as when written.

"The Council are not insensible to the advantage that would result from the adoption of one uniform system of weights and

measures, to be used alike for all substances and in all countries, and they observe with satisfaction the efforts which have been made for the realisation of this object; but considering the paramount importance of avoiding errors in preparing and dispensing medicines, they cannot recommend that, in such operations, a system should be adopted which has been as yet but little used, and is to a great extent unknown in this country; and on this account they have not employed the metrical system, even as an alternative, excepting in the processes for volumetric estimations, which are now so arranged that the same solutions may be made and used either with British weights and measures or with those of the metrical system."

Let us now hear one or two authorities, illustrating the struggle of the metric system in France—its native land:—

"It is very important to weigh and measure medicines with uniform weights and measures: the metric or decimal system admits of this being easily accomplished. However, the difficulty of understanding the value of grammes, kilogrammes, decigrammes, etc., and the capacity of litres, decilitres, etc., has caused the use of the ancient pound, with its ounces, drachms, scruples, and grains to be preferred" (*Dictionnaire Universel de Matière Médicale et de Thérapeutique Générale*, par Mérat et De Lens, Paris, 1833, vol. v., p. 408).

Here is a quotation from Gray's Pharmacy:—"The French philosophers, for parade, have vapoured much of a new weight to be deduced primarily from an admeasurement of a degree of the earth's surface. The initial weight to be called a gramme, from which the other terms are deduced decimally. Although the new chemical books in French nominally use the gramme, yet in all their processes for practical purposes it will be found that they are mere reductions of the common weight to the decimal scale, so that the new metrical system has only mystified, to use a French word for hoaxing, the students, and produced a similar discrepancy between books and the laboratories as the new nomenclature has produced in many instances between books and the shop. Indeed, their government has lately given up the point, and allowed the use of the old pound, ell, etc., only ordering them to be divided decimally, as is done in England with long measures, whenever convenience requires it, without any coercion" (*Elements of Pharmacy*, by S. A. Gray, London, 1823, p. 14).

The same author, in his supplement to the Pharmacopœia, 5th ed. London, 1832, p. xxxvi. (latterly edited by Redwood), says:—

“Before the Revolution there was only one pile of weights in common use in France; in endeavouring to introduce one upon philosophical principles there are now no less than four. The Revolutionists, misled by the apparent facility of a decimal scale, introduced the metrical system in 1795. The academicians complain much that the great government departments of the navy and artillery have never adopted this weight, not considering the great expense that it would occasion to recast all the artillery and balls.

“The faculty of medicine at Paris, in translating their *Codex Medicamentorum*, or *Pharmacopœia*, into this new system of weights, did not esteem it necessary to use the exact reduction, but adopted a system of round numbers, and in some parts quoted both the old and their new weights, that the preparers might use either; thus a third system of weights was established. For example—

Old French Weight.	Exact Metrical Weight, Grammes.	Round Number of the Codex.
1 lb.	489·51	500·
1 oz.	30·594	32·
36 grains	1·91	2·
20 grains	1·062	1·

“It is not a little singular that the medical faculty of Paris should, like that of London, prefer creating a new pile of weights rather than employ the same as are used by all other persons. In 1812 the metric system was abandoned, but instead of reverting to the old pound of Charlemagne, a new pound was decreed; and thus four system of weights are in common use, including that of the Codex. The confusion thus introduced by continual alterations may be easily conceived.”

In conclusion, by all means let the metric system be sanctioned for purposes of foreign trade, yet surely there is no reason that our *Pharmacopœia* and English pharmacy should lose their identity on that account. Moreover, while medicine should be the last of the arts to adopt any measures not well understood, let us in matters of science stick to science, and in matters of our art stick to art, and if we would improve our art by the application of science let it be in the direction of making wonders plain rather than plain things wonders. And in this adoption of the metric system, if an appeal were made to the pharmacists and dispensers of this country I doubt not that an overwhelming majority would vote with the cock in the fable; for you will remember that while

pursuing his art of scratching he turned up a sparkling gem, and in expressing his sentiments respecting it, he said, "Doubtless this is a very fine thing, but give me the grain!" And in his choice he displayed considerable sagacity, for in the grain he recognised his bread and butter.

The PRESIDENT said this was an extremely able and interesting paper, which he hoped would provoke a useful discussion. Perhaps the President of the Pharmaceutical Society, who gave evidence before the Select Committee on the subject, would have something to say.

Mr. MICHAEL CARTEIGHE said this paper was in some respects amusing, and it no doubt brought before them some of the statements which had been made from time to time with regard to the want of logic and accuracy in the metric system. He did not quite know what the author wished the Conference to discuss. Were they to consider the advisability of using the metric system in all the daily avocations of life, or to confine themselves to pharmacy? Perhaps for the purpose of the discussion it would be convenient to consider principally how far the introduction of the metric system into the Pharmacopœia as a process of manufacture and preparation, irrespective of the dose—which was not proposed to be included—would be a disadvantage. The author seemed to think that if this system were introduced in the directions for preparations, it must at some future time be also introduced in the dose. That was possible, but it did not by any means follow, and that was the defect of the paper throughout. The logic underlying the paper was perfectly sound, but all systems of weights and measures were natural systems, and nothing would prevent the great mass of the community from continuing that system which was a natural system in their own particular country any more than laws of the most penal character, which existed in some parts of Europe, would prevent a man born a German from speaking his native language in a French land, or a patois like it. Every Swiss child was compelled by law to learn both French and German in order that he might be able to earn his living in any canton of the Federation, but nevertheless he had a third language, a patois, which nobody could understand but his neighbours. It did not follow that that patois should continue to be the standard of language. He agreed with Mr. Elborne that the French themselves in their domestic life in buying and selling did use the old

system, and he saw no harm in their using it at all, but he knew that the application of the metric system to the enormous business of the country saved a great deal of error and friction, and tended to increase trade in the highest sense of the term. If the metric system was only one to be used on paper it would be extremely useful. He did not propose to give any opinion whether the metric system was good or bad, it was too late in the day to rake up those old arguments. It did not matter a bit what the standard was; a standard might be made in all sorts of ways. The old standard which formed the basis of the English system of a pendulum beating seconds was probably the most scientific of all, but for practical purposes it was a matter of little consequence what the standard was; but it was a matter of great consequence that all English-speaking people, whether in Canada, Australia, or America, and even those not English speaking, should be to some extent in touch with us, and that we should be in touch with them. There was a time when we were proud of our insular position, and there were advantages in it, but the insularity had received serious knocks of late years, and we found that other European nations could do a great many things which we once did. It was necessary, therefore, to consider how far in a matter of this sort it was not desirable from a trade aspect to adopt the metric system. His contention was that it was absolutely impossible for us to go on with the idea of having an Imperial Pharmacopœia unless there were introduced into it, side by side with the British system, the metric system for the purpose of manufacture. He had grave doubts himself, as he expressed in the evidence he gave before the Committee, whether ten years would be enough to educate medical men to think in doses on the metric system. He might say further that one of the members of the Committee spoke to him afterwards in reference to having the system adopted voluntarily, which he had recommended, and said he was rather inclined to agree with the opinion expressed by Mr. Goschen some years ago, when Chancellor of the Exchequer, when it was proposed to deal with this subject in a compulsory way, who said that it would cost the Government that proposed it its existence, because it was just one of those things that touched every man, woman, and child, and it would be resented very largely unless it were introduced in the most gradual and natural way. Our coinage was an instance of how little people liked change. There was no reason why the metric system should be called a scientific system, but it was the system practically adopted by all the pharmacists in the world, and did

Mr. Elborne seriously think that Englishmen were so wanting in intelligence that they could not manage to devise practical processes in that system? He thought they all knew what the fluid grain was. At any rate, he was quite sure that a very large number of candidates knew the metric system at the present moment a great deal better than they knew their own. There was not a single candidate he had ever examined who did know completely the basis of the system of weights and measures he had been in the habit of using all his life. It seemed to him that the dangers referred to with regard to prescribing were not quite so serious as they were represented. It did not follow that you were in a prescription to order the dose in numerals or decimals; there was no difficulty in writing a gramme though it looked very like a grain, or a decigramme, or a centigramme, or you could put milligramme and write one thousand after it. The question of safety might be dealt with hereafter. All they were concerned with was whether the introduction of the metric system would facilitate intercommunication with our own people in Canada and elsewhere. There the United States Pharmacopœia was used. The pharmacists of that country looked on themselves as go-ahead people, and they had adopted the metric system solely in the recent edition. It seemed to him that for the purpose of the preparation of medicine the system could be introduced without the slightest difficulty. The question of its introduction was not seriously before the pharmaceutical world. When it was proposed years ago to introduce it into the Pharmacopœia, all the doctors imagined that they would have to prescribe in those terms, and to have the doses so arranged. It had been pointed out, however, that that did not follow at all, but that in a standard book where directions were supposed to be given with a certain amount of accuracy, there was a convenience about the system in many ways which seemed to point to the desirability of its introduction, at any rate as an alternative system in the Pharmacopœia. His object in giving evidence was not to press the point whether the system should be introduced, but to point to the fact that such a proposition was being made, and that by the Act for consolidating the various Weights and Measures Acts, passed some years ago, the permission they formerly had to use those weights had been taken away; his object was to prevent the absurdity of a pharmacopœia being published with permission to use the metric system of weights and measures, when at the same time the representatives of the County Council might go into a pharmacy and fine a proprietor

40s. for having illegal weights and measures in his possession. He did not wish to speak as a person who considered the metric system as the most perfect, but it was the one used in all accurate work throughout the civilised world, and the best answer to Mr. Elborne's objections was that when a nation like the Germans used a system invented by their natural enemies, the French, the Britisher, with all his pride, might very well be content to follow.

Mr. W. A. H. NAYLOR said it must be admitted that when the metric system was placed in juxtaposition with the British, as was done in this paper, it did look a trifle ridiculous, but, as Mr. Carteighe had said, there would be found no difficulty in understanding the system if it were introduced, and it would certainly be a very workable one in commerce. There was something to be said in favour of the metric system. Supposing he put the question to Mr. Elborne, and asked for an immediate reply, How much hydrochloric acid was there in a given quantity of liquid extract of cinchona?—of course, in the metric system it would be seen at a glance, but it could not be seen at a glance in the ordinary system; you had to calculate the pints into ounces and into drachms in order to get at the proportion. He was not in a position to speak as a dispenser of medicine, but he thought Mr. Elborne had slightly exaggerated the point—perhaps his remarks were humorous rather than serious—with regard to requiring a balance to weigh these very small quantities. Of course, they could be weighed without any difficulty; 30 milligrammes could be easily weighed now with an ordinary pair of scales.

Dr. C. SYMES said, although not a strong advocate of the metric system, he quite appreciated the advantage of using it voluntarily in the Pharmacopœia. Mr. Elborne had quoted opinions as to difficulties which arose in early days, but the very fact that his quotations from English authorities pointed out difficulties, showed that they had been considering this matter for a great many years, and had been gradually getting educated to a knowledge of it. The remarks of Dr. Redwood rather pointed to the fact that he thought some time it would be used, though the time had not come then, and that was probably twenty years ago. The fact that this had been always talked about seemed to imply that it was intended to come some time. The question was whether they should go on and progress, or abandon it altogether. Mr. Elborne admitted that for all scientific purposes the metric system was valuable, and it occurred to him when that passage was read that as they were always trying to elevate pharmacy, and to show that

it was closely related to science, if they deprecated this because it was a scientific system it was rather like reducing them to the level of a common tradesman who could not grasp anything beyond a pound or an ounce. It was very desirable that they should be able to think in this system at the present moment; if one spoke of a gramme they thought of it as being about $15\frac{1}{2}$ grains, but they did not want to think that at all. The gramme should at once convey some tangible quantity to the mind, just as the grain did at present. He admitted that the grain would never be superseded altogether, because they were accustomed to think about it, but if they were accustomed to think about the gramme as they did about the grain there would be no difficulty. The system from its simplicity had been very generally adopted, and if they were to keep abreast of the times, they must take the step some time or other of having it introduced voluntarily at first; probably ten or twenty years hence would be soon enough to make it compulsory. The tendency to round off figures did cause some slight discrepancy. He had noticed recently an ounce spoken of as 25 grammes, and it struck him that there was a good deal of rounding off there; they could get much nearer than that without difficulty. With regard to the doses, he did not think there would be any great difficulty, as at present they often had to deal with prescriptions in metric weights and measures, and it was far better that they should become familiar with them.

Mr. J. C. UMNEY said, as a wholesale druggist, he should like to say a word about the County Council regulations with regard to weights, which Mr. Carteighe had referred to. It was the absurdity which Mr. Carteighe and others took such a strong stand against. They were to check goods inwards from foreign countries with metric weights, and attar of roses they were allowed to check by Turkish weights on entry, but not to sell by Turkish weights on foreign trade. It was that inconsistency that led to the present regulations being called in question, and the County Council had now given notice that they would not interfere with the use of the metric system for export trade. Mr. Elborne had endeavoured to show the absurdity of calculating the formula of the present Pharmacopœia into the metric system, but in working on large quantities it was extremely convenient to work in thousandth parts and hundredth parts. In making extracts, etc., they were accustomed to work either with one-thousandth parts, if it was not too great a quantity, or with fiftieth, twenty-fifth, or twelve and a half, and then by simple

multiplication it was easily seen what was the percentage proportion in any preparation, while the cost was much more easily ascertained than when you had to deal with a quantity of say 4·13 ozs., and attempted to work that into the cost of the product. If you had a definite quantity of twenty-five, fifty, or one hundred to work with, there was a great saving of time and labour.

Mr. KEMP said he thought Mr. Elborne had raised unnecessary difficulties with regard to the *extractum cinchonæ liquidum*. He pointed out that 20 ozs. was represented by 566·99 grammes, and that there would be great difficulty in reducing the quantity when they wanted $2\frac{1}{2}$ ozs., but it seemed to him as Mr. Elborne had been so many years engaged in chemical work, and had become so familiar, and had worked almost invariably in the decimal parts of everything, that the first thing that would have presented itself to his mind in this case would be to start off by bringing it into thousandth parts, and then it would be the simplest thing possible to divide by moving the decimal point, and if necessary, multiplying by two, four, or six, as the case might be. It would be quite possible to work with 1/1000th grammes or 100 milligrammes, and the proportion might go through all these formulæ with very little variation indeed. With regard to any difficulty as to the proportion of dosage, though not a prescriber, he did not see why it made so material a matter whether a pill was ordered to be 5 grains or only 4·98 grains. Medical men now ordered 10 minims of what was called a 1 per cent. solution, under the impression that they were getting 1/10th of a grain, but they were not actually. If they had the metric system when they were ordering 1/10th, or 10 minims, or whatever it might be, they would have a definite quantity easily understood by everyone. As to the difficulty which the average chemist would have of grasping these things and altering them from the present system to the metric, he thought the metric system had from the very earliest times of compulsory examinations been one of the subjects in which candidates had been examined, formerly in the Minor, and now in the First, examination, and the time was approaching when everyone who had passed an examination would at least understand sufficient of the metric system to be able to adopt it.

Mr. PARRY said there were many points which did not seem quite clear in Mr. Elborne's paper. For example, he said that a 5-grain blue pill must necessarily in the metric system become pil. hydrarg. 0·325 grain. Why a blue pill was not a blue pill in

the metric system, or why there should be any further difficulty in nomenclature he did not understand. Even now when a foreign prescription was presented, if Mr. Elborne required such delicate correctness in the conversion of these weights, did he weigh 15·43 grains for each gramme, and dispense it? It seemed to him that this was an attempt to reduce medicine and pharmacy to the level of an art, when it was certainly far more of a science, and to talk about the revolutionary measures which all scientists wished to welcome was without any force. No measure of any kind would be accepted unless it were certain that it would give considerable advantage in the way Mr. Carteighe had pointed out.

Mr. MICHAEL CARTEIGHE said there was one point in the paper which was somewhat laboured, which, with all due deference, seemed to have impressed the author more than it should. He seemed to have thought from the suggestion of the Committee which recommended the introduction of the system, that they were doing this in order that they might have a definite weight and volume, and he had shown that, having regard to the densities of different liquids, there would be a certain amount of inaccuracy in these solutions, and they would not be strictly, even then, decimal or centesimal solutions. Having regard to the fact that potent preparations, with the exception of hypodermic solutions, were made dilute, he did not think that went for very much. No doubt, with regard to such preparations as syrups and things of tolerably high gravity, when the compilers of the Pharmacopœia began to tackle the work they would not be able to do as they seemed to think they could, and as Mr. Martindale seemed to be quite sanguine about—*i.e.*, make it possible to have solids by weight and liquids by measure throughout—without considerable variation and difficulty. Nevertheless, looked at as a whole, the system of relationship between the gramme and that which Mr. Elborne abused so much, the cubic centimetre, was so definite, and the error so much less than in our own system, that for practical purposes Mr. Elborne had rather overwrought that part of his argument.

Mr. JONES said there was one point Mr. Elborne had carefully avoided, but which should be remembered in discussing this matter, and that was its relation to their medical friends. They knew that they often read foreign papers, and that even foreign papers were often translated into English. They would therefore, no doubt, be glad to have the option of writing the prescriptions

in the metric system. He thought, also, the author had done injustice to Jacob Bell in quoting him as an authority against this system. His words were that he wanted a reformation instead of a revolution. Now reformation was not stopping in the same place, but going forward.

Mr. BIRD thought the difficulty arising from misplacing the decimal point was more apparent than real. To the practised eye, the difference between .5 gramme and .05 was as absolute as between 5 grains and half a grain. Then, with regard to the difficulty of weighing very small quantities, it was a common thing in pharmacy to receive a prescription ordering a one-twentieth, one-thirtieth, or one-hundredth part of a grain of some rare alkaloid. In that case how would Mr. Elborne overcome the difficulty?

Mr. ALCOCK said, as a teacher of pharmacy, he should like to add a word substantially emphasising what the President of the parent body had said. He feared with him that the younger members knew the metric system very well, but that their knowledge of the weights and measures of the British Pharmacopœia he was sorry to say was very deficient. His invariable question to a new man was, How many grains are there in an ounce? and he invariably told him 480. He desired to emphasise strongly the view that before adopting the metric system which they knew very well, they should insist on students knowing the system already in use.

The PRESIDENT said they were greatly indebted to Mr. Elborne for this paper. As he had anticipated, the discussion had been interesting. The matter lay in a nutshell with regard to the present Pharmacopœia. As long as the legally accepted weights and measures in this country were what they were, the British Pharmacopœia must be published in those weights and measures, but probably it was wise to put the metric system side by side with it, and it was absolutely necessary if the Pharmacopœia were to have any imperial character. He did not think there would be the smallest difficulty in regard to pharmacists, because they all learned chemistry, and that was most universally taught in the metric system. Every burette was graduated in that system, and the man who used the burette in his volumetric work, and in learning his chemistry, learned the metric system. It was a question of the laws of the country. It might be they would not get the metric system adopted as the only legal standard for the next two years, perhaps not for the next six or seven years,

but that it should be illegal for a man to sell a litre of a thing was in a civilized country preposterous. They should be allowed to use either measure. The new Pharmacopœia must contain the present weights and measures; there were many advantages in the old system. It was easy in many respects, and lent itself to division very easily, but that was no reason why they should not have side by side with it the metric system, which was already very largely used for manufacturing purposes, and very convenient, and it would probably make the book much more useful to English-speaking communities, and facilitate intercommunication between ourselves and foreign countries.

Mr. ELBORNE, in reply, said he had nothing to say against the metric system in itself; it was very nice indeed; he had worked with it for some time, and for research work or investigation he should never think of using anything else. But pharmacists did not get their living by research, and on that account he did not see any reason whatever why the metric system should be introduced into the everyday art of pharmacy. It seemed to him that this was the thin end of the wedge of the metric system, and that in a future Pharmacopœia the English weights and measures would slip out altogether. The object of his paper was simply to put the case, as he thought, fairly. Some gentlemen seemed to think he had exaggerated it, but at all events it would be useful to see what might be the possible issue of this introduction. Surgeons and physicians and men practically engaged in pharmacy were not asking for this. It was done at the instigation of manufacturers. He did not say that pharmacists should put inconveniences in the way of manufacturers, but he was inclined to think that if this system was introduced solely, it would cause much more of the preparations to fall into the hands of the manufacturers and wholesale druggists. The Pharmacopœia was intended for retail pharmacists, the quantities were worked out in pints, and it was intended that the pharmacist should prepare his own pint of tincture. Again, it was said that pharmacists were at the present time sufficiently well educated to embrace this system, but in so important a matter they did not provide for the accomplished, but for the duffers. Taking the result of a recent examination, some 60 or 70 per cent. of the men got thrown out. Mr. Naylor had charged him with being unduly humorous, but sometimes there was a certain amount of truth in a jest. One gentleman thought the medical fraternity were desirous of this change, but his experience did not accord with that. Another thought he

had discredited pharmacy by alluding to it as an art, but he must adhere to that statement; pharmacy was an art, though it should be made as scientific as possible.

Mr. Elborne was thanked for his interesting communication.

The next paper read was one on—

THE VOLUMETRIC SOLUTIONS OF THE BRITISH PHARMACOPŒIA.

By WILLIAM ELBORNE, B.A., F.I.S.

Pharmacist and Demonstrator of Materia Medica at University College Hospital.

In a recent memorandum issued by the Therapeutic Committee of the British Medical Association in reference to the approaching revision of the British Pharmacopœia is the following:—

“*Tests for Purity.*—The tests for the recognition of the purity of drugs in the Pharmacopœia are in need of complete revision. Chemistry has made considerable advances since some of them were introduced, and it is desirable that they should be replaced by others in accordance with present chemical knowledge.” And in this, in so far as the volumetric test solutions are concerned, the Committee is right.

The British Pharmacopœia being intended to constitute “one uniform standard and guide whereby the nature and composition of substances to be used in medicine may be ascertained and determined” (Preface to B.P., 1867), it would appear consistent that the nomenclature and preparation of its volumetric test solutions should conform with the established principles of chemical science, for “in the production of the present edition pains have been taken to bring the whole of the matter up to the existing state of knowledge” (Preface, 1885).

Yet, in the sense adopted at all the chemical schools throughout the country, these volumetric solutions, frequently alluded to as “Standard Solutions,” are as a group not quite entitled to that designation, inasmuch as in their preparation the nomenclature and standard of chemical equivalence generally accepted are not uniformly adopted.

Now by Faraday’s general law (involving no theory) that equal quantities of electricity on passing through different electrolytes

require equivalent quantities of the ions for their support, if an electric current be passed through a series of electrolytes in the same circuit, then the quantities of hydrogen or metals liberated as well as those of the acid radicals, are in equivalent proportions; if, for example, the current be passed through solutions of silver-nitrate, cupric sulphate, and antimony trichloride, in series in the same circuit, the quantities of metal simultaneously deposited are in the proportion of 108 of silver to $\frac{1}{2}63\cdot3$ of copper to $\frac{1}{3}120$ of antimony, and of the acid radicals, NO_3 , $\frac{1}{2}\text{SO}_4$, and $\frac{1}{3}\text{Cl}_3$, the standard being hydrogen=1. A standard solution for purposes of chemical analysis therefore possesses a definite composition, and is prepared in conformity with, or normal to, the standard; and the definition of a volumetric normal or standard solution, as accepted by chemists, is, therefore, as follows:—A normal solution contains in 1,000 C.c. the equivalent in grammes of the active substance; a solution of one-tenth the strength is called a decinormal solution ($\frac{\text{N}}{10}$), and one of one-hundredth a centinormal solution ($\frac{\text{N}}{100}$).

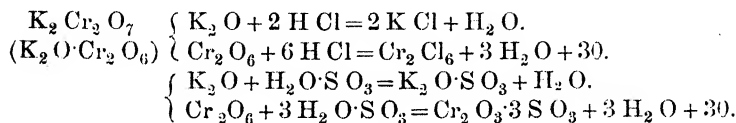
Volumetric Solution of Soda, $\text{Na H O} = 40$.—One litre of the B.P. solution contains 40 grammes of Na H O . In this solution the active substance is sodium, the equivalent of which is 23. Since 40 grammes of Na H O contain 23 grammes of sodium, the resulting solution contains the gramme equivalent of sodium per litre, and is consequently normal; this preparation should consequently be entitled, "Normal Volumetric Solution of Soda."

Volumetric Solution of Oxalic Acid, Crystallised oxalic acid, $\text{H}_2\text{C}_2\text{O}_4, 2\text{H}_2\text{O} = 126$.—The B.P. solution contains 63 grammes per litre. In this solution the active substance is the oxalic acid radical; being bivalent, its chemical equivalent is $\frac{1}{2}\text{C}_2\text{O}_4$. Half the gramme molecular weight of the crystallised acid consequently contains the gramme equivalent of the acid radical; this solution should therefore be entitled, "Normal Volumetric Solution of Oxalic Acid."

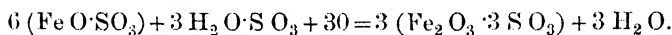
Volumetric Solution of Nitrate of Silver, Silver nitrate, $\text{Ag NO}_3 = 170$.—The B.P. solution contains 17 grammes per litre. In this solution the active substance is silver, the equivalent of which is 108, and one-tenth of the gramme molecular weight of Ag NO_3 (17 grammes) consequently contains one-tenth of the gramme equivalent of silver; the solution should be entitled, "Decinormal Solution of Silver Nitrate."

Volumetric Solution of Bichromate of Potassium, Potassium bichromate, $\text{K}_2\text{Cr}_2\text{O}_7 = 295$.—The B.P. solution contains 14·75 grammes

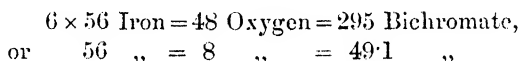
$\text{K}_2\text{Cr}_2\text{O}_7$ (i.e., $\frac{1}{2}\text{K}_2\text{Cr}_2\text{O}_7$) per litre. Bichromate solution is used in presence of excess of dilute acids as an oxidising agent (officially for the oxidation of ferrous to ferric salts); in this solution oxygen is regarded as the active substance, the chemical equivalent of which is 8. In acid solutions a gramme molecule of $\text{K}_2\text{Cr}_2\text{O}_7$ may be regarded as acting thus, liberating $3 \times 16 = 48$ grammes of oxygen available of oxidation purposes:—



and with ferrous salts the oxygen acting thus—

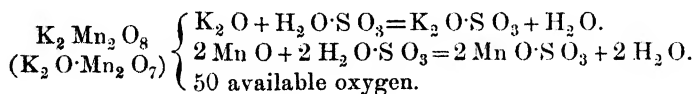


Consequently—

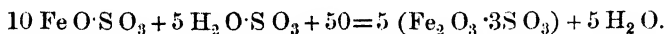


49.1 grammes of Bichromate therefore contain the gramme equivalent of oxygen, and this quantity of $\text{K}_2\text{Cr}_2\text{O}_7$ dissolved in water up to a litre would constitute a normal solution. Might not a "decinormal solution of potassium bichromate" (viz., 4.91 grammes per litre) be adopted?

Decinormal Solution of Potassium Permanganate, $\text{K}_2\text{Mn}_2\text{O}_8 = 316$. —In the estimation of iron by bichromate solution an external indicator of potassium ferricyanide is requisite, whereas by using volumetric solution of permanganate no indicator is required, the solution being run in until the characteristic red colour of permanganate after agitation becomes permanent. Like bichromate it is used for iron in acid solution, and a gramme molecular weight may be regarded as behaving as follows:—



and with ferrous salts the oxygen acts thus—



Now the gramme molecular weight of $\text{K}_2\text{Mn}_2\text{O}_8$ yields $5 \times 16 =$

The next paper read was one entitled—

REMARKS ON THE BRITISH PHARMACOPŒIA.

WITH REFERENCE TO SECURING THE MORE GENERAL USE OF THE WORK
AND RECOGNITION OF AN IMPERIAL CHARACTER.

By CHARLES SYMES, PH.D.

If it were absolutely necessary that a British Pharmacopœia should be perfect and complete in all its details, the task of production would be an exceedingly difficult one, and if then perfect it were made to comprise the pharmacy of all our dependencies the difficulties would be almost insurmountable. But perfection is not in the ordinary nature of things, and although a reasonable attempt to reach near to it in such an important work as the Pharmacopœia is to be commended, the delay which would be caused by an overstraining of this point is to be deprecated. The colonists are thoroughly loyal in the matter of pharmacy, and the British Pharmacopœia is now much used by them. There is, however, a large contingent of the foreign element present, and the French Codex and other pharmacopœias and works are consequently in request. Then the natives have local remedies in use, and they have different methods of preparing and using some of the remedies already existing in the B.P.

If, therefore, it is deemed desirable to extend the use of the work in these various countries, not only will it be necessary to include some additional drugs, but a number of formulæ must be added. In framing these, consideration must be given to the wants and conveniences of the various peoples. For example, concentrations, which have become rather an abomination in English pharmacy, must be maintained, and possibly their number increased on account of the fact that the facilities for transit in newer countries are not so great as in this. Now the suggestions from our medical and pharmaceutical friends in the various parts of the British possessions will help materially in this matter, but, of course, it will be impossible to include everything that is suggested, and a reasonable selection will be necessary. British influence extends far beyond British rule, and we may hope at some time to take this fact into consideration in the publication of a Pharmacopœia. In Africa, not only at the Cape, but so far up country as Johannesburg, pharmacy is practised almost precisely as in England, and the British Pharmacopœia is more used than any other. In Brazil the B.P. is used, but not so much as the French

Codex, the "Formulariæ Guia Medica of Chernoviz" being used more than either of them—not merely because it is published in the Portuguese language as there spoken, but on account of its containing some particulars concerning native drugs, therapeutical notes, and other matters of interest to the medical profession. Now this raises the question—Is the work to become The Imperial Pharmacopœia of Great Britain and her Colonies, and if so, what is it to comprise? Pharmaceutically, there are those who would cut it down to very small dimensions, giving the least amount of information on the smallest number of drugs and preparations; whilst others would have it not only what it now is, but a handbook of chemical analysis and a text-book for students. Medically, there are those who would be quite satisfied if the book contained nothing more than formulæ for compressed tablets; whilst others would have it a complete treatise on medicine and therapeutics. Obviously, discretion would suggest the happy mean.

The Medical Council is the body charged with the production and publication of the work, and it may be (indeed, has been) said that we, as pharmacists, have really nothing to do with what it should, or should not, contain. But this is merely a statement, it is not argument, and merely calls for the reiteration of what has been many times said by myself and others, viz., "That the Pharmacopœia Committee ought to consist partly of pharmacists." I would not advocate that the work should be rendered too voluminous, but it is worth consideration as to whether its usefulness and general adoption would not be advanced by some additions. In 1867 doses of the various drugs and preparations were for the first time appended, and this step has proved very valuable both to physicians and pharmacists. The proposal to supplement the weights and measures in the new edition by quantities according to the metric system, will be appreciated by many. May not a posological table be added, in which the doses have their equivalents given according to this system?

It is quite a common thing for medical men to inquire what is the solubility of various substances in water, alcohol, etc. Could not a table of solubilities be added of sufficient value to justify the use of the space it would occupy? A therapeutical table would be frequently referred to by medical men, and the more they look to the work for information the more likely are they to prescribe the remedies and formulæ contained therein.

A secondary list of new drugs still under trial and old ones gradually becoming obsolete would be an acquisition. It is un-

desirable that too frequent changes in the body of the work should occur, but such changes could be made in the secondary list without inconvenience, and if thought desirable a new one could be published between the successive editions of the Pharmacopœia. Broadly, it may be said that additions of this kind, which will render the work more useful at home, will cause it to become more popular abroad, where it is our desire and our interest to make it so. The opening up of Africa is likely in time to enrich our materia medica. Quite recently we had to prepare fluid extracts from some African drugs sent over for that purpose, with a view to getting reliable data as to their efficacy in their native country. They were as follows:—Shagarai bark, egirah bark, ehghessy, shappo, gboyboinsha, egiatah, ghamgha, black plum, yellow plum, and finger root. Now no one would expect all of these to get into the Pharmacopœia, but if two or three of them showed evidence of undoubted value they would first appear in the secondary list, and ultimately one may get into the body of the work. Tables could be added which would make the work more useful for reference by pharmacists, but I take it that these are unnecessary, as if it is more frequently used by the medical profession, increased use by pharmacists is sure to follow.

Mr. E. M. HOLMES thought one of the strongest arguments for the admission of pharmacists to the Pharmacopœia Committee was the fact that Squire's *Companion* and Martindale's *Extra Pharmacopœia* were more used by medical men than their own Pharmacopœia.

Mr. F. C. J. BIRD said he always thought it would be very useful if the general character of the ordinary galenical preparations were given, and the object of the different tests might be stated. It was a very high tribute to the useful work the Conference was doing to notice the number of references to papers read there in the report of Dr. Attfield to the Pharmacopœia Committee of the General Medical Council.

Mr. M. CARTEIGHE said he had received information that the Pharmacopœia Committee of the Medical Council now sitting had appreciated the work of the Conference in every respect, and whenever any suggestion was brought before them with "B.P.C.," it was recognised at once without discussion.

Mr. M. CONROY thought one of the greatest improvements in the British Pharmacopœia would be the one suggested in the paper,

viz., mentioning the solubilities of salts after their characters. He did not think it would be necessary to have a table. When working pharmacists had so often to refer to a book like Squire's or Martindale's one could understand the difficulty a medical man would have in finding out these solubilities.

Mr. ALCOCK said he apprehended all the doses would remain in as at present. That was of very great importance to pharmacists. He had heard it said that the doses were likely to be taken out. It seemed to him it was highly essential that they should be retained, because the pharmacists had to refer to them in cases of doubt.

Mr. DRUCE, after thanking Dr. Symes for his very interesting paper, said he gathered that he would rather put in the metric equivalents of the doses than leave anything out. If they were to have as an alternative the metric system in the formulæ, it would be desirable also to have the metric equivalents of the doses. He might be going over old ground, but as an examiner of the Society he might say that when he was approached on the question of the desirability of a practical examination of candidates in the metric system in conjunction with ordinary weights and measures, with the natural conservatism which he possessed he said no. He was on the side of the grains. That the metric system was a good thing no one could doubt, and few would fear its introduction. They wanted in time to get weights and measures on a metric basis, but the time would be far distant when medical men would write prescriptions in that way. At any rate for practical, scientific, and manufacturing purposes there was no doubt which system was preferable.

Mr. COLLIER said it appeared to him that medical men desired a Pharmacopœia which would give them practical information respecting the drugs which they could make use of in prescribing. With regard to solubility, what the medical man desired to know was how much of any particular substance he could put into the ordinary quantity which he ordered, viz., an ounce, for instance, how much chlorate of potash could be got in solution in an ounce of water. The information would be more useful if expressed in that way than if put in the tabular form.

Mr. McEWAN said the great difficulty of introducing solubilities in the Pharmacopœia under the characters and tests would be that such statements thereby became available for public analysts. It was a very different thing to state that chlorate of potash was soluble 1 in 20 or 1 in 24 to a doctor, than to make a specific

statement in the British Pharmacopœia, because unless you had the authorities stating it absolutely correctly, the very week afterwards the analysts would come down on them and say it was not accurate. Pharmacists ought to say what they meant when they wanted a table of solubilities. Was it a general thing which would be of assistance to dispensers rather than to prescribers (you could not expect a medical man to carry a Pharmacopœia with him), or should the statement be made in the nature of the character of the substance which was to be taken, along with other characters, as a proof of its purity or otherwise?

Mr. BOWMAN suggested that in the case of suppositories it made a great difference whether they contained a light drug like tannin or a heavy one like mercurial ointment. In order to get uniformity they should be made up to a certain weight.

The PRESIDENT said this was a valuable paper. Whatever the Pharmacopœia contained or did not contain he could assure Mr. McEwan that there was certain to be somebody somewhere who would come down on those who had to do with its production. It was the common fate of books of that kind to be criticised very largely. The 1885 Pharmacopœia was criticised very severely indeed by himself amongst others; perhaps the next one he might not feel quite so much inclined to criticise, for in the ten years which had elapsed since 1885 an immense amount of knowledge had accumulated which might or might not make its appearance in the new Pharmacopœia. If it did not it would be only fair to criticise the new one. Notwithstanding all that was said against the 1885 Pharmacopœia, the Americans had largely copied it; they had adopted the preparations for standardising, and in many ways they copied some of the features of the 1885 Pharmacopœia, and he always maintained in face of the American pharmacists, who claimed to know very much and to teach Englishmen, that that book was very creditable to English pharmacy and medicine. With regard to the secondary list our own Pharmacopœia had not favoured a secondary list, but the Formulary Committee had, by suggesting formulæ for menstrua, strength of spirit, and so on, done useful work in that way, and he felt quite sure from what he knew of English pharmacy and medicine that the new Pharmacopœia or Imperial Pharmacopœia, whichever it was called, when it did appear would be a worthy successor of that of 1885, and he hoped it would contain features which would cause it to be purchased and used by as large a proportion of medical men as it had been by pharmacists. Of the 14,000 copies

sold of the last edition the majority of them had gone to pharmacists, and only a very small percentage to medical men. Now there were 35,000 medical men on the Register, and if this book was to be the guide for medical men to prescribe, and the authority which the pharmacists were to adopt, both medical men and pharmacists should possess copies.

Dr. SYMES, in reply, said he thought the Pharmacopœia Committee should consist partly of pharmacists. Mr. Carteighe had called attention to the recognition which the Medical Council had given them in the fact that they were very useful to them in preparing their work, and that they recognised freely anything in the B.P.C. formulæ. That was the best argument why they should be actually represented and should constitute part of the Pharmacopœia Committee. His interest was too closely allied with the medical profession to say anything to hurt their feelings, but he must protest against the fact that the law provided that a body of medical men alone should publish a work of this kind; the bulk of the work was not medical work—scarcely anything, except the doses; it was pharmaceutical and chemical work, and yet no pharmacist or chemist as such had any official representation on the body which produced it. If the Medical Council could make graceful compliments, and found pharmacists so exceedingly useful, why should the latter not be officially recognised? It at first occurred to him that it would be more convenient if the statement as to solubility occurred after the description of the drug, but Mr. McEwan had answered that suggestion by stating that if the solubility were placed after the drug it might be taken as a test when not so intended. There was a little word in the Pharmacopœia very much abused, but a very useful one, the word “about,” and if they had a table at the end giving the solubilities he should be inclined to recommend that the word “about” should be placed there. The figures would be sufficiently accurate for medical purposes, and could not be taken as tests of the substances, and he could not help thinking that if Dr. Attfield did not use the word scientifically, at any rate he used it wisely in many cases.

Dr. Symes was thanked for his interesting communication.

The next paper read was on—

THE RECOVERY OF ALCOHOL FROM TINCTURE MARCS.

By F. C. J. BIRD.

The complete recovery of the residual alcohol from the exhausted marcs of pharmaceutical preparations is an operation which has hitherto presented considerable difficulty, both on the large and small scales, chiefly on account of the imperfect methods in use for effecting the purpose. Loss by evaporation during the process of manufacture can, to a great extent, be guarded against by the employment of air-tight percolators, etc., many excellent types of which have been devised by practical pharmacists during the last decade. It is in dealing with the alcohol retained by the marc that the greatest loss is experienced, and to overcome this the processes of displacement by water pressure alone, and pressure followed by distillation, are relied on in the practice of the laboratory. Mr. R. H. Parker, in a paper read at the Oxford Conference, ably discussed the method of displacement by water, and showed that in certain cases it was a thoroughly practicable one in competent hands, although requiring considerable care and attention for successful working. There is, however, more loss than is at first apparent in the experiments he mentioned, as the volume of tincture obtained does not consist entirely of spirit but contains the extractive of the drug as well. Mr. Parker also gave several instances in which displacement was inapplicable, the deficiency of product being too great. In such cases pressure alone or, on the large scale, pressure followed by distillation, is the only alternative method. Distillation is carried out in two ways. Either the pressed marc is stirred up with water, and after standing transferred to a percolator and more water passed through until the alcohol is extracted, the percolate being subsequently distilled, or the marc is placed directly in a capacious still with sufficient water, and by means of a mechanical agitator passing through the still head, thoroughly stirred up from time to time during distillation. It is essential to add sufficient water to the marc to form a comparatively thin liquid, otherwise ebullition only takes place where the marc is in contact with the interior surface of the still; whilst, from the non-conducting nature of the thick magma, the temperature near the centre remains low, and the spirit there is not driven off. Marcs containing much starchy or mucilaginous

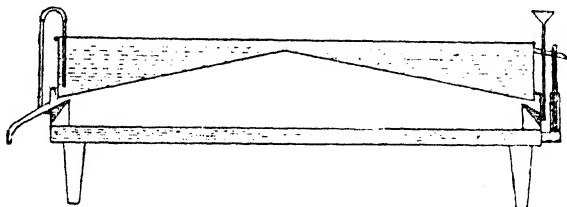
matter require a large quantity of water, and are the most difficult to deal with. The distillate is much weakened by the water which comes over with it, and redistillation is generally necessary in order to concentrate it, thus involving further labour and loss. From these considerations it is obvious that if a marc could be treated directly without the intervention of water, the spirit would be recovered of its normal strength and in a fit state for use in the same or a subsequent preparation.

If a tincture marc be spread out on an evaporating dish heated on a water bath, alcohol vapour rises and is dissipated in the atmosphere, a moderate continuance of the heat sufficing to drive off the whole of the moisture and completely dry the marc. A polished cold surface held a short distance above a marc so heated immediately induces condensation of the alcohol vapour, and small streams of liquid trickle in various directions over the glass. It was thought that this principle of surface condensation might be usefully applied to the subject under consideration, the only essential being a permanently cold surface over the material, and suitable provision for the collection and carrying away of the condensed vapour. Professor W. G. Gregory, in 1889, described in the *Pharmaceutical Record* an application of this principle to a pharmaceutical still, the special feature of which was a grooved cooled surface above the liquid, and a trough for the condensed distillate, the usual condensing worm being dispensed with altogether. An illustration also appeared some little time ago (I think in an American journal) of a still, in which Professor Gregory's condenser, instead of being rectangular with a grooved bottom, was made circular and with the bottom cone-shaped. This particular form of condenser appeared likely to lend itself to the construction of an apparatus capable of evaporation at a low temperature, such as is necessary in the recovery of spirit from marcs without the intervention of water, and, in accordance with this idea, I had a water bath made and fitted with what may be termed a condensing cover. The details will be readily apparent from the subjoined sectional sketch.

The lower part of the apparatus forms the water bath; it is of large area and very shallow, and is furnished with a side tube for a thermometer. The condensing cover is a circular water tank, having the bottom dished up in the form of a cone, the edge of which terminates above a V-shaped trough round the inner edge of the water bath. This trough is cooled by a cold water jacket underneath, and is inclined so that all liquid runs out by the exit

tube leading from it. These water pipes are so arranged that the current of cold water passes first round the water-jacket of the collecting trough and then into the condensing cover, which rests on a flange in the water bath. The joint is secured by luting. It will be noticed that the condensing surface is very near the material to be desiccated and the whole construction of large area and shallow, the dimensions being: diameter, 15 in.; depth of water bath, 2 in.; height of cone in centre, 3 in.¹

The marc having been spread evenly over the bottom of the water bath, the condensing cover luted on, and a small stream of cold water turned into the apparatus, the application of heat is quickly followed by condensation of spirit. This takes place at a remarkably low temperature. When dealing with a proof spirit



marc, for instance, a fairly rapid succession of drops falls from the delivery tube at 80° F., and at 140° F. the greater part of the spirit may be recovered. A known quantity of rectified spirit may be mixed with a dry marc, and practically the whole of it separated, but it is in dealing with those preparations containing weaker spirit, which are not amenable to displacement and show a loss on pressing, that the apparatus will probably prove of value. As an illustration of its capabilities I give details of two experiments. I.—24 oz. marc from tinct. aurant., B.P., was placed in the water bath, the false bottom filled with water at 180° F., and the condensing cover with cold water. Left undisturbed overnight, the receiving bottle next morning contained 7 fl. ozs. spirit at 21° overproof. II.—80 fl. ozs. tinct. rhei co., B.P., was prepared by macerating the ingredients with a portion of the spirit, draining in an air-tight percolator and percolating with the remainder of the spirit. The tincture which passed through measured 60 fl. ozs. The contents of the percolator were then transferred to the water bath and heat applied. The spirit recovered measured 21 fl. ozs.

¹ The above block was gratuitously lent by the Editor of the *Pharmaceutical Journal*.

at proof strength, giving a total product of 81 fl. ozs. from the 80 ozs. taken, the increase being, of course, due to extractive. The dry marc weighed $8\frac{1}{2}$ ozs., having lost $2\frac{1}{2}$ ozs. I may mention that the only object of this experiment was to show the amount of spirit that could actually be recovered from a tincture marc. The condensing water bath seems specially applicable in the production of fluid extracts by repercolation, as practically the whole of the spirit can be recovered from each percolator as it becomes exhausted without either pressing or displacement, and used in place of fresh menstruum for the succeeding percolator. It is obviously very suitable for the recovery of other volatile solvents, as chloroform and ether, and the distillation of alkaloidal preparations like those of belladonna, where a low temperature is essential.

A description of an excellently designed still, under the name of Dicker's patent still, appeared a short time ago (*vide P. J. Supplement*, March 16, 1895), and from this I gather that the makers consider the cone arrangement of condenser to be patented. This form, however, is one which should be widely known and will probably find many applications in pharmacy; doubtless therefore the controllers of the patent will be willing to put an apparatus such as I have described on the market.

Mr. J. C. UMNEY asked if the authorities would not regard this as a still and require a licence for its use. If so, that would be a drawback to its use on a small scale.

Mr. M. CONROY said this was very useful as a practical paper, and so far as he could see it would be a great improvement on the process generally adopted by manufacturers in recovering their spirit, inasmuch as the spirit was recovered at such a low temperature that it would contain much less of the volatile principles of the drug than by the process now adopted. If it were suitable on a large scale no doubt it would be a great help to large manufacturers, but he feared the size of the still required to deal with a marc from many gallons of tincture would have to be very large indeed. He understood the marc had to be spread very thinly over the bottom.

Dr. C. SYMES said the principle of condensing by cold water on the top of the still had been in use for several years, and was adopted in an apparatus for repercolation which he showed at Bloomsbury Square some years ago. They were much indebted to Mr. Bird for bringing forward a small apparatus which would

enable pharmacists to recover spirit from marcs. It had this advantage, that it would enable pharmacists to be less dependent upon manufacturers, and to take an interest in the manufacture of their own products. One thing which prevented the pharmacist from doing so was the loss which he sustained in the marc. If you attempted to distil the spirit from the marc with an ordinary still, you immediately wanted some mechanical arrangement for keeping the marc moving. There was all the difference in the world between attempting to distil spirit from a marc by keeping it quite still, and keeping it moving, and generally a mechanical agitator was adopted on a large scale.

The PRESIDENT said they were much indebted to Mr. Bird. The value of the apparatus described, no doubt, was its usefulness on a small scale. Although he had no disposition to pit pharmacists against manufacturers, or make any distinction between them, it was desirable that the pharmacist should be able to make a pint of tincture if he wished, and to do it economically. That was the object of the Pharmacopœia and of the Conference. If he liked to spend time in doing so, a piece of apparatus like this was very valuable.

Mr. BIRD said he had great pleasure in bringing the apparatus forward, because he thought it would be of real service. No doubt the Excise authorities would regard it as a still, but most chemists kept a still, and he did not suppose that would be a great bar to its use. Mr. Conroy was rather under a misapprehension as to its capacity. The one shown would take about 2 lbs. of dry marc—sufficient for one to two gallons of tincture, which was as much as the pharmacist would prepare. The marc might be spread to the thickness of an inch and a quarter. He had brought down some marc with him, and was prepared to show the apparatus, but, unfortunately, there was no convenience for applying heat, and therefore he could not put it to work. With respect to Dicker's still, he understood the cool trough was the part patented. Before he had this apparatus made he was in doubt whether to have the cool trough in the top part or the bottom, but he thought it would be more convenient to have it at the bottom. Still, it could be easily made in the top, and then he did not think it would infringe the patent.

Mr. Bird was thanked for his valuable paper.

The next communication being one on—

SYRUP. HYPOPHOS. CO., B.P.C.

By W. A. H. NAYLOR, F.I.C.

At the Oxford meeting of the Conference last year a paper entitled "Laboratory Notes," was read by Mr. F. C. J. Bird, in which the statement was made that the sulphuretted odour sometimes emitted by syrup. hypophos. co., B.P.C., resulted from the reduction of sulphates by the free hypophosphorous acid present in the preparation. To me the statement was a startling one, but my inability at the time to disprove it by reference to experiments of my own or those of others induced me to refrain from comment. The desire to present the fixation of what I believe to be a wrong impression must be my apology for presenting this simple note. To arrive at a decision on the question, the following experiments have been made:—

(a) Potassium sodium and calcium sulphate were dissolved separately in a 15 per cent. solution of hypophosphorous acid in the proportion of 20 grains to the fluid ounce. To detect faint traces of sulphuretted hydrogen or sulphurous acid, the operation was conducted in the apparatus to be presently described for the testing of phosphuretted hydrogen, the reagent (cup content) in this instance being starch iodide or free iodine, V.S. At the moment of mixture no odour was recognisable, and during the month the several solutions were under observation the liquid in the cup did not become decolorised. In a second series of the same solutions coils of filter paper impregnated with lead acetate and kept continuously moist were suspended for five weeks. At the end of that period no discoloration of the lead paper had taken place in any of the solutions. On the addition of 0.2 per cent. of sodium sulphite to any one of the solutions, evidence was shortly afforded of the liberation of sulphuretted hydrogen.

(b) Ten grains each of potassium, calcium, and manganese hypophosphite, and the equivalent of ferrous hypophosphite in solution, all of which contained small quantities of sulphates, were severally shaken up with $\frac{1}{2}$ drachm of hypophosphorous acid (30 per cent.), $3\frac{1}{2}$ drachms of water, and $1\frac{1}{2}$ ounce of syrup. No sulphuretted odour could be detected either at the time or during the period it was set aside.

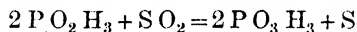
(c) Alkaline sulphates were dissolved in a 15 per cent. solution of hypophosphorous acid and boiled, with the result that neither

sulphuretted hydrogen nor sulphurous acid gas was evolved nor was sulphur precipitated.

(d) Syrup. hypophos. co., B.P.C., made from ingredients containing small quantities of sulphates, but free from sulphites, afforded no trace of sulphurous acid or sulphuretted hydrogen.

These results distinctly negative the idea that sulphates are reducible by hypophosphorous acid under conditions that would be likely to exist in the making and storing of syrup. hypopos. co., B.P.C.

If the bad odour occasionally emitted by the syrup be not traceable to the reduction of sulphates by hypophosphorous acid, to what is it due? My experience points distinctly to sulphites as the incriminating substance. When to an alkaline sulphite in aqueous solution is added an excess of hypophosphorous acid, sulphurous acid, and then sulphuretted hydrogen, are formed and can be recognised by their smell. After the solution has stood for a time it will be found that all unpleasant odour has disappeared, sulphur has deposited, and an equivalent portion of hypophosphorous acid has become converted into an alkaline acid phosphite. ¹ Ponderf has shown that dry sulphur dioxide reacts with hypophosphorous acid in the manner indicated by the equation—



the principal product being phosphorous acid and free sulphur. He further remarks that at the same time hydrogen sulphide is evolved and some phosphoric acid is formed.

It may be mentioned as the result of direct observation that 1 grain of sodium sulphite in 1 pint of syrup. hypophos. co. suffices for the production, to a pronounced degree, of sulphuretted hydrogen.

I have not met with a sample of a hypophosphite which contained a sulphide or hyposulphite or any impurity other than a sulphite to which a sulphuretted odour could be referred.

As a phosphuretted is not dissimilar to a sulphuretted smell, and as the presence of one or the other could not be identified by the nasal organ in a mixture of both, it seemed desirable to apply some chemical test by which this recognition could be effected. The required test, the efficiency of which has been repeatedly verified by me, is based upon the ready solubility of reduced silver and the insolubility of silver sulphide in dilute nitric acid. It

¹ *Journal of the Chemical Society*, 1877, i., page 275.

may be advantageously applied in the following way: To a strong aqueous solution of a hypophosphite in a wide mouth glass stoppered bottle add a little diluted sulphuric acid and shake vigorously. If after standing a bad odour develops, the glass stopper is replaced by a sound cork. In the centre of the under surface of the cork there has been inserted a narrow glass tube, the opposite end of which is bent upwards and shaped like a small cup. Into this cup a few drops of silver nitrate solution have been placed. By this means the test solution is brought into immediate contact with the vitiated atmosphere above the liquid. After a short time the blackened contents of the cup are collected on a filter, washed free from soluble silver salt, and treated with dilute nitric acid. If the liquid (filtrate) responds to the test for silver it must be assumed that phosphuretted hydrogen was present, if the deposit remained insoluble, or was only partly soluble in diluted nitric acid, and if sulphur separated when it was treated with nitric acid, it must be inferred that sulphuretted hydrogen was present.

Of a number of samples of hypophosphites which I have recently examined, not one gave when suitably treated an odour that could be traced to phosphuretted hydrogen.

The result of my examination of commercial samples may be conveniently presented in tabular form:—

Sample.		No.	Sul- phates.	Sul- phites.	Phos- phates	Phos- phites.	Chlo- rides.	Cal- cium.
Potassium	Hypophos.	1	traces	absent	absent	present	absent	traces
"	"	2	"	"	"	"	"	"
"	"	3	"	"	"	"	traces	"
"	"	4	"	"	"	"	absent	"
"	"	5	"	present	"	present	traces	"
						very small		
Sodium	Hypophos.	1	fair qty.	absent	"	present	"	present
"	"	2	traces	present	"	"	"	"
"	"	3	"	"	"	"	"	traces
"	"	4	fair qty.	absent	"	"	absent	"
"	"	5	traces	present	"	"	present	"
Calcium	Hypophos.	1	fair qty.	absent	present	mere trace	absent	—
"	"	2	traces	"	traces	absent	"	—
"	"	3	"	"	present	present	"	—
						very small		—
"	"	4	"	"	"	"	"	—
"	"	5	"	"	"	absent	"	—
Manganese	Hypophos.	1	fair qty.	"	absent	present	present	absent
Barium	Hypophosphite	1	traces	"	"	"	"	"
Hypophosphorous	Acid	1	"	"	"	0.232 p.c. H ₃ PO ₃	traces	fair qty.

It will be observed that phosphites were present in every sample save two. To detect phosphites an aqueous solution of the hypophosphite was acidified with acetic acid, precipitated with lead acetate, and the washed precipitate decomposed either with sulphuretted hydrogen or diluted sulphuric acid, the latter reagent being the more convenient. To the clear filtrate, from the lead sulphide or sulphate, was added a slight excess of mercuric chloride, and the whole was heated for about an hour to 80° C. The precipitate in every case was tested and proved to be wholly or in part mercurous chloride. In testing for chlorides the Pharmacopœia of the United States requires that after heating 10 C.c. of a 5 per cent. aqueous solution of sodium hypophosphite with 1 C.c. of nitric acid, the solution should remain clear upon the addition of silver nitrate T.S. For the direction "*after heating*" I would substitute "*after heating in a test-tube in a water-bath for an hour.*" By following this more definite instruction the object in view is attained.

The above table shows that the precipitate thrown down by lead acetate is not necessarily a single compound, but that it may consist of lead sulphite, sulphate, phosphite, and phosphate respectively, or of a mixture of two or more of these, and possibly other impurities. As a test it is severely exclusive, but is lamentably lacking in discriminative qualities.

One word on the keeping properties of syrup. hypophos. co., B.P.C. When made with commercially pure ingredients the syrup can be stored in bulk in glassware for three or four weeks without becoming cloudy or depositing. It must not be forgotten that its tendency to change is inherent, and that upon its natural instability or the facility with which it decomposes its value as a remedy is understood to depend. If it be desirable to prolong the period during which the syrup ordinarily remains bright, this may be done by adding to the present formula potassium citrate in the proportion of 80 grains to the pint.

The PRESIDENT said this was an extremely valuable communication. The experiments made were very exhaustive, and Mr. Naylor seemed to have traced very conclusively the cause of the disagreeable smell that sometimes arose.

Mr. BIRD said he personally felt very much indebted to Mr. Naylor for having got to the bottom of this interesting point. He did not know really whether the presence of sulphate might

not be to some extent a measure of the presence of sulphite. A sample of calcium hypophosphite which contained sulphate would be likely to contain sulphite, and therefore, if they found the sulphite they would reject the sample accordingly. He should like to know how Mr. Naylor explained the production of the sulphuretted odour when the syrup was made with beetroot sugar. He had always found that however careful you might be in making the syrup, if you use beetroot sugar, you always got the sulphuretted odour. The addition of citrate of potassium in the syrup seemed to him to be a decided improvement. The deposit generally consisted of ferric hypophosphite, and potassium citrate was a powerful solvent of that substance. From some experiments he tried some time ago he could quite corroborate what Mr. Naylor said about the preservative effect of citrate of potassium. In examining a number of samples of commercial hypophosphite, he generally found calcium hypophosphite most impure, and manganese came next. Potassium hypophosphite was generally the purest of all.

Mr. J. C. UMNEY said he had recently had occasion to make experiments on the subject alluded to by Mr. Naylor, and he examined the hypophosphites supplied by three principal manufacturers, and in every case he found phosphites present in the calcium hypophosphite. He communicated with all of them, and they all said they had made every endeavour to free them from phosphite, and had the matter now under consideration, but had not succeeded. With regard to keeping this syrup he found solution of ammonium citrate even more convenient than potassium citrate.

Mr. GROSE said this was a very interesting paper. The retail pharmacist often got into difficulty with regard to this preparation. He might make a batch all right, and the next day on dispensing it find sulphuretted hydrogen given off. If any means could be devised by which that could be prevented, and they could make small quantities with more confidence in their keeping qualities, it would be a great advantage.

The PRESIDENT said the paper was so exhaustive that it did not need an elaborate discussion. They were much indebted to the author.

Mr. NAYLOR said he did not quite follow Mr. Bird's remark that the calcium sulphate was the measure of the calcium sulphite.

Mr. BIRD said the point was that if calcium sulphite were present the sulphate would probably also be present.

Mr. NAYLOR said the samples he examined all contained traces of sulphate. If beet sugar were used, and if a sulphuretted hydrogen odour then appeared, it must be due to some impurity in the beet sugar. It might be due to something which had been used in purifying the sugar, such as ultramarine, or to sulphite in some form. Mr. Umney remarked that citrate of ammonia was more convenient than citrate of potassium. It was not a question of convenience or expense, but would it keep better? He had had no experience of it. He had simply used citrate of potassium. He should say the moral of the paper was—reject all samples of hypophosphites which contained sulphites. By doing so he did not think they would meet with the development of this sulphuretted hydrogen odour. There was one paper which he had entirely overlooked, but had been pointed out to him recently. It was written many years ago on this very question by Mr. Gibson. As far as he could make out, Mr. Gibson was the very first to suggest that sulphates were decomposed by hypophosphorous acid into sulphurous acid, and then by the further reduction of the hypophosphorous acid upon sulphurous acid sulphuretted hydrogen was given off, and eventually sulphur precipitated. It would be found that wherever one got a sulphuretted hydrogen odour one eventually got a very slight precipitate, or the steely appearance which very finely precipitated sulphur presents.

The author was thanked for his valuable paper.

In the absence of the author the following paper was read by Mr. J. C. Umney:—

NOTE ON A SAMPLE OF SPURIOUS TOLU BALSAM.

By J. OLDHAM BRAITHWAITE.

Although the appearance in commerce of abnormal samples of balsam of tolu has been noticed from time to time,¹ the abnormal characters of a consignment of the drug which has reached the London market *via* New York during the last few months may be worth recording.

This spurious balsam does not differ very materially from the genuine in appearance or consistence, although it is somewhat darker and more tenacious; the odour, however, is less fragrant, and the taste decidedly weaker.

No crystals are visible when a small portion is warmed and

¹ Naylor, 'Year-Book,' 1878, 261. Cripps, 'Year-Book,' 1889, 182.

pressed out under a cover glass on a glass slip, and only a few scattered crystals are discernible when examined under the lens with the polariscope.

When treated with warmed bisulphide of carbon it is found that a very large portion is dissolved, and further, on evaporating off the solvent, the residue consists of a dark somewhat viscid resin, becoming harder on prolonged heating. Genuine balsam of tolu so treated gives a varying amount of soluble matter. The residue left on evaporating the solvent is, however, quite distinctive, rapidly forming a mass of white or pinkish crystals. Upon determining the "saponification number" of this carbon bisulphide residue some interesting figures were obtained, the resin from the spurious sample requiring a markedly less quantity of potash for its saponification than the crystalline residues obtained from the others.

The following are the results of the examination of various samples, a portion of an authentic specimen of the balsam from the Museum being kindly furnished me by Mr. Holmes, who informs me that it is more than twenty years old.

Sample.	Character.	Per cent. sol. in CS_2 .	Characters of CS_2 residue.	Saponification No. of CS_2 residue.
No. 1	Museum Specimen.	30.7	Pinkish white crystals.	320
" 2	Spurious.	64.1	Bright resinous, resembles dark Canada balsam.	216.4
" 3	"	76.36	" "	211.1
" 4	"	77.26	" "	226.1
" 5	"	75.8	" "	214.5
" 6	"	65.28	" "	224.7
" 7	"	67.24	" "	217
" 8	Genuine.	22.86	Crystalline mass.	303.5
" 9	Doubtful.	45.6	Partly crystalline.	286.5
" 10	Genuine.	17.78	Crystalline mass.	352.7
" 11	"	33.8	" "	331
" 12	"	20.14	" "	340
" 13	"	27.1	" "	364

For the determination of the saponification number of the portion soluble in carbon bisulphide, 5 grammes of each sample are treated with two successive portions of 25 c.c. and 10 c.c. respectively of pure CS_2 warmed gently with constant agitation for ten minutes, the solvent decanted into a wide-mouthed flask, removed by distillation, the residue cautiously dried and weighed; it is then saponified with excess of standard alcoholic potash solution by

boiling under a reflux condenser. In the final titration of the unused potash by standard acid, it is found preferable to use phenolphthalein paper to determine the saturation point; the end of the reaction is thus more sharply visible than in the dark solution than when the indicator is employed in the usual way.

The results obtained indicate the value of the "saponification equivalent" in the testing of samples of tolu balsam. This figure for the carbon bisulphide residue should certainly not fall below 300. The weight of the residue itself would appear to vary considerably in genuine samples.

In the next edition of the Pharmacopœia it might be desirable to add to the present characters and tests some such details as follows:—

"When 5 parts are gently warmed with two successive portions of 25 and 10 parts of carbon bisulphide, and the solvent decanted into a tared flask, the residue on distilling off should be distinctly crystalline, and each 1000 parts of this residue should require for its saponification not less than 300 parts of potassium hydrate.

Although the source of the resin soluble in carbon bisulphide has not been determined, it is somewhat significant that the saponification equivalent of a freshly prepared sample of copaiba resin was found to be 204.

Mr. ALCOCK asked if the proportions were given of the solubility and the material dissolved.

Mr. MOSS said Mr. Braithwaite had done exceedingly good work in making these tests. It often happened in the London market that one was in doubt from the appearance of a lot of balsam of tolu whether it was genuine or not. Recently there had been a few cases of genuine old-fashioned balsam of tolu on sale, and most of the large houses succeeded in getting a small quantity of it. To have a test like this which distinguished very readily between what was spurious and evidently made up and that which was a genuine product, was an exceedingly good thing, and the thanks of manufacturers and wholesale druggists, as well as retailers, would be given to Mr. Braithwaite for having devised these tests.

Mr. HOLMES said the specimen used by Mr. Braithwaite from the Museum was taken out of the original tin which was there when he went there twenty-three years ago, so that it must have been more than twenty years old. Balsam of tolu being a drug which

occasionally came to the market and then disappeared, naturally gave rise to substitutions, and more than once he had seen false specimens offered in the market. The specimens now referred to had sufficient odour of balsam to deceive a great many not constantly handling the drug, and one could easily understand that considerable quantities were purchased. When they were put on their guard in this way great service was done to the drug trade. The easiest way, as far as he knew, of determining readily whether balsam of tolu was genuine was simply what the author mentioned, to take a little, warm it on a microscopic slide, put another slide on top, and examine the specimen with a lower power. If it were not full of crystals it might be decided that it was a bad one.

The PRESIDENT said thanks were due to Mr. Braithwaite for this note. It must often happen that other people besides New Yorkers tried to substitute drugs. The wholesale druggists in the City were the first to come in contact with anything spurious, and no doubt for the sake of their own reputation they kept a sharp look-out, but they laid pharmacy under an obligation when the scientific men working in their laboratories took the trouble to write such notes.

Mr. J. C. UMNEY said the proportion of solubility was given in the table. With reference to what Mr. Holmes said, they were always on their guard, for this particular consignment was sold to a great many wholesale druggists, without giving a sample, as genuine balsam, for cash on receipt of documents. In consequence of that, a considerable quantity had been rejected, amounting to nearly £1000 worth.

A vote of thanks was accorded to the author for his valuable note.

The Conference then adjourned for luncheon.

On resuming, the following paper was then read by Mr. F. Ransom :—

THE QUALITY OF COMMERCIAL POWDER OF IPECACUANHA.

By HENRY G. GREENISH, F.I.C.,

Professor of Materia Medica to the Pharmaceutical Society of Great Britain.

In February last I communicated to the Pharmaceutical Society¹ the results of a comparative histological examination of a number

¹ *Pharmaceutical Journal*, liv., 685.

of samples of ipecacuanha, the majority of which were taken direct from original bales. These results were summarised as follows :—

Ipecacuanha root, whether Brazilian or Carthagena, may be distinguished as such in the form of powder by (*a*) the shape and size of the starch grains, (*b*) the absence of vessels, presence of perforated tracheids, (*c*) the acicular raphides, and (*d*) the emetine reaction with chlorine.

The stem may be distinguished from the root (in powder) by (*a*) the presence of sclerenchymatous cells, (*b*) of lignified cells of the pith, and (*c*) of spiral vessels.

Lastly, Carthagena ipecacuanha may in most cases be distinguished from Brazilian by the larger size of its starch grains. In this respect it must be carefully remembered that Carthagena roots with small starch grains occur that are practically indistinguishable when powdered from Brazilian roots with large grains.

These results have an eminently practical bearing. The majority of pharmacists, if not all, purchase their powdered ipecacuanha as such from the wholesale druggists, and it must be regarded as essential that the retailer should be in a position to exercise a control over the powder so supplied. For this purpose the assay as at present effected is, in this as in nearly every similar case, insufficient. It is not enough to know that a powdered ipecacuanha contains 2 or 2·5 per cent. of alkaloid capable of being extracted by a particular method, and yielding the emetine reaction. If this were the case, sawdust mixed with the alkaloid obtained in demetinsing ipecacuanha might be regarded as complying with the requirements to be demanded of a good sample of powdered ipecacuanha. In point of fact, in judging the quality of a powdered drug by the proportion of alkaloid it yields, two assumptions are commonly made; first, that the alkaloid extracted consists of nothing but the alkaloid pre-existent in the drug; secondly, that such alkaloid is the sole active principle in the drug, and alone regulates its physiological effect. Both these assumptions are commonly made when powdered ipecacuanha is valued by the result of the assay; in this case both assumptions may be, the second certainly is, incorrect. The liability to error is much diminished, though not entirely removed, if the purity of the powdered drug, that is its freedom from foreign admixture, is previously determined. This determination, which can be effected by the

microscope, and by that alone, must be regarded as necessarily supplementary to the assay.

Before such a microscopical examination of a powdered drug can be undertaken with any prospect of obtaining reliable results, the microscopist must make himself familiar with the structure of the typical drug, as well as the principal variations from the type that may occur in commerce. He will then be in a position to detect that which is not genuine. This is the principal point, for the determination of the nature of the impurity is of secondary importance.

In the case of ipecacuanha, the minute examination of a number of different commercial samples of the genuine drug has been made, and it is now possible to proceed to the examination of the commercial powdered drug.

Thirty-two samples were obtained from pharmacists in London and the provinces. They were carefully examined with the view of ascertaining, first, whether they consisted of genuine ipecacuanha; secondly, from what commercial variety they had been prepared; and lastly, the commercial quality of the drug that had been used, particular attention being directed to the presence of stem, and of an undue proportion of wood. The results are embodied in the table on opposite page.

None of the samples examined showed the presence of any adulteration in the shape of foreign starch or foreign drugs; the presence in four of unduly numerous coniferous tracheids indicates possibly only carelessness in cleansing the mill rather than wilful adulteration. Twelve samples out of the thirty-two proved to be powdered Carthagena ipecacuanha; it is possible that amongst the twenty classed as Brazilian there may be some few that are in reality Carthagena, and that amongst those classed as Carthagena there may be some which are mixtures of Carthagena with Brazilian. I have previously drawn attention to the impossibility of satisfactorily distinguishing some exceptional samples of Carthagena ipecacuanha from the Brazilian drug. Carthagena ipecacuanha is not at present included in the British Pharmacopœia, and its use must therefore be regarded as a substitution.

Only one sample can claim to be regarded as the powder of really good Brazilian root free from stem. Without insisting upon the complete absence of this impurity, it must be admitted that much of the powdered ipecacuanha sold by pharmacists contains an undue proportion of stem and wood; the former is an avoidable impurity, since it can easily be separated from the commercial

Sample	Variety.	Principal Microscopical Features.	Quality.
1	Brazilian	No stem, much parenchyma, little wood.	Very good.
2	"	Stem present; woody; occ. foreign fibre.	Medium.
3	"	Not much stem; coniferous tracheids; foreign fibre.	Medium.
4	"	Not much stem; woody.	Medium.
5	"	Stem present; fragment of leaf.	Medium.
6	"	Stem present; coniferous tracheids; woody.	Medium.
7	"	Much stem.	Medium.
8	"	Stem present; woody.	Medium.
9	"	Stem present; woody.	Medium.
10	"	Not much stem; not much wood.	Good.
11	"	Not much stem; much too woody; overheated.	Bad.
12	"	Not much stem, not much wood, coniferous tracheid.	Good.
13	"	Not much stem; not much wood; occ. fibre.	Good.
14	"	Much stem; very sandy.	Bad.
15	"	Not much stem; not much wood.	Very good.
16	"	Much stem; fragment of leaf.	Medium.
17	"	Not much stem; occ. fibre; conif. trach.; very woody.	Bad.
18	"	Not much stem; woody.	Medium.
19	"	Very little stem.	Good.
20	"	Not much stem: not much wood.	Good.
21	Carthagena	Stem present; woody.	Medium.
22	"	Very little stem; not much wood.	Good.
23	"	Stem present; woody.	Medium.
24	"	Stem present; woody.	Medium.
25	"	Much stem; woody.	Bad.
26	"	Much stem; woody.	Bad.
27	"	Very little stem; not much wood.	Good.
28	"	Stem present; not much wood.	Good.
29	"	Very little stem; rather overheated.	Good.
30	"	Much stem; woody.	Bad.
31	"	Much stem; woody.	Bad.
32	"	Little stem; woody.	Medium.

drug by picking; the latter indicates the use of an inferior drug.

The results of the examination may be summarised as follows:—

Quality of Commercial Powder of Ipecacuanha.

Good Brazilian	22 per cent.
Medium	31
Bad	10
Carthagena	37

An instructive comparison may be made with the results of the examination of powdered ipecacuanha published by Ranwez and

Campion¹ in Louvain. They show that powdered ipecacuanha of Belgian commerce may be classed as follows:—

Normal (Brazilian)	. . . . .	15 per cent.
Too woody	. . . . .	40 „ „
Carthagenæ (wholly or partly)	. . . . .	15 „ „
False cultivated ipec. ² (wholly or partly)	30 „ „	

From this it is evident that, although in quality the powdered ipecacuanha of English commerce leaves much to be desired, it is distinctly better than that supplied in Belgium. It is at least free from gross adulteration or substitution, but appears to be comparatively rarely prepared from high grades of Brazilian root.

The PRESIDENT said this was an extremely valuable communication, and they were much indebted to Mr. Greenish for it. He was sorry he was not present to read it. There were several important points in the paper. One thing was pointed to clearly, viz., the value of the histological examination of drugs. For some time chemistry had had its way, and set up to be sole arbiter from which there was to be no appeal; but it would be found in future that vegetable histology would claim an equal place in the determination of the value of many of these older drugs, which were the sheet anchor of many medical men in the treatment of disease. They welcomed every advance in chemistry, and if chemistry could demonstrate that it knew what were the constituents of every particular drug, and what was the physiological effect of those constituents, no doubt chemistry would win hand over hand; but in the absence of that information, and in the strong presumption over hundreds of years that there were other constituents of which chemistry did not take note, it was extremely important to cultivate this histological knowledge, and to put it to practical use. Of the thirty-two specimens it appeared that the very good were two, the good nine, medium fourteen, and the bad only seven, and of those seven four were Carthagenæ. No doubt in the examination of drugs, their physical condition and histological and chemical examination must all be the province of the pharmacist if he were to provide the medical man with drugs of known value, which would be constant in their effects.

¹ *Annales de Pharmacie*, i. 114.

² By this designation is meant the drug offered at the London sales as "East Indian Root," probably the rhizome of *Cryptocoryne spiralis*.

Mr. HOLMES said he had had the pleasure of seeing what Mr. Greenish had done in the matter, and some of the specimens had been taken from the Society's Museum. The time taken to prepare a paper of this kind was far more than was generally imagined. When they found that histology was doing so much for the craft, they might congratulate themselves that they had men like Professor Greenish who would take pains and spend time in finding out the best means of examining powders, because the powders were the crux of the profession. Pharmacists did not prepare them themselves as a rule, because the fineness required called for special mechanical means. It was very gratifying to find that the wholesale trade benefited so much by these investigations. When they found that out of thirty-two specimens of English ipecacuanha practically none contained an adulterant, it was a matter for congratulation. With regard to Carthagena root, he did not think they were in a position to say whether it was inferior or equal to the Brazilian from a chemical point of view. What the alkaloids were, or what their effect was, they could not be certain; but in the collection of Pereira, nearly fifty years old, there were specimens of large granulated ipecacuanha, unquestionably the same thing as the Carthagena, and undoubtedly within the last twenty-three years the Carthagena had been used in commerce. Professor Greenish was quite right in saying it ought to be regarded as a substitution, but they were not in a position to throw away any chance of making powders as effectual as possible. Ipecacuanha was used very largely in croup, and it was therefore of great importance that the medical man should be certain of its having proper effect. He hoped to see ipecacuanha powders marked "root only," showing that the woody part had been eliminated.

Mr. J. C. UMNKY said his firm had been in the habit lately of including in their price lists "powdered ipecac., from root only," and "from hand-picked root," in order that this question might not arise. Until two years ago a large proportion of root was found to contain a small percentage of stem; but for the last year or two it rose to 30 or 40 per cent. On analysing the stems compared with the root, he found the percentage of total alkaloids was less, and therefore it became necessary that something should be done. On behalf of some wholesale druggists, Professor Attfield and others made an examination of the root, and gave it as their opinion that the roots contained a much larger proportion of alkaloids than the stems. In consequence of that, many put on their

prices current "powdered ipecac., from root only," and "powder from hand-picked root." Unless the retail druggist specified the contrary, he was supplied with powdered ipecac. root, and charged a proportionate price. What Mr. Greenish said was very interesting about the certainty with which powdered Carthagena root could be detected, at any rate when not mixed with powdered Brazilian root. But if he remembered rightly, Dr. Paul had shown that the proportion of cephæline was relatively greater to the emetine than in the Brazilian. Therefore, until the point was cleared up which of the two alkaloids, if they both existed, was the one to which the emetic properties were due, they would have at any rate not to use Carthagena either for powders or for galenical preparations. They found about three-fourths of the alkaloids in the stem as compared with hand-picked roots.

Mr. GROSE said he presumed, in drying the root, the whole of the root was passed through the sieve, the woody portion as well as the cortical.

Mr. J. C. UMNEY said yes; there were numbers published giving the relative proportions of woody and cortical portions.

A vote of thanks was accorded to Mr. Greenish for his practical note.

The next paper read was one entitled:—

ACETIC EXTRACT OF IPECACUANHA.

By F. C. J. BIRD.

The loss of alkaloid which occurs when acetic extract of ipecacuanha is prepared by the process of the present Pharmacopœia has been frequently commented on by pharmaceutical writers, and any one who is in the habit of making this article must have been struck by the disproportion which always exists between the percentage of alkaloid in the root used and the alkaloidal value of the finished extract. The recent researches of Paul and Cownley have demonstrated that both emetine and cephæline are affected when their acetic solutions are evaporated to dryness and exposed to the temperature of a water bath for any length of time, and it is evident that in the manufacture of the acetic extract the period of evaporation should be shortened as much as possible. In Dr. Attfield's recent report to the Pharmacopœia Committee of the Medical Council, certain improvements in the formula are suggested which will doubtless tend to decrease the amount of alkaloid de-

stroyed. One of these consists in the evaporation of the percolate in separate fractions, a departure from the letter of the official directions of which probably all manufacturers have been guilty for a long time past, and another lies in the reduction of the quantity of acetic acid to one-fourth of the present proportion. This latter, especially, will probably have a very decided influence on the yield of alkaloid, as it is apparently the tenacity with which the pectinous matter of ipecacuanha retains acetic acid which is responsible for the long-continued heat necessary to render the extract sufficiently dry for powdering.

Before seeing Dr. Attfield's report I had made some experiments with a semi-alcoholic extract, and thinking they may be of interest to the Conference, I give the details below. Twenty-four ounces of Brazilian ipecacuanha was reduced to No. 20 powder, and divided into three equal parts of 8 ozs. each, A, B, and C.

A was macerated with 8 fl. ozs. acetic acid and an extract made exactly as directed in the Pharmacopœia, the only divergence from the official instructions being that the percolate was evaporated in fractions.

B was macerated with 4 fl. ozs. acetic acid and 8 fl. ozs. S. V. R., percolation being continued with S. V. R. to exhaustion. The marc was then removed from the percolator and stirred up with 4 fl. ozs. acetic acid and 4 fl. ozs. distilled water. After standing twelve hours the marc was returned to the percolator and exhausted with distilled water. The aqueous extract having been evaporated to dryness, the spirit was distilled from the alcoholic percolate, the resulting syrupy liquid added to the dry aqueous extract, and the whole dried and powdered. The effect of this was disappointing, as the aqueous residue appeared to re-absorb acetic acid, and evaporation took much longer than was anticipated.

C was reduced to No. 60 powder and macerated with glacial acetic acid, 1 fl. drachm, and S. V. R., 8 fl. ozs., percolation being continued with S. V. R. to exhaustion. The liquid was then distilled and the syrupy residue evaporated to dryness. The marc having been treated with acetic acid, 4 ozs., and distilled water, 4 ozs., and allowed to stand twelve hours, was returned to the percolator and exhausted with more distilled water, the aqueous percolate evaporated to dryness, mixed with the dried alcoholic extract, and the whole powdered.

In working on any quantity by the above process the spirit in the marc would, of course, be recovered before treatment with

water. The alkaloid in the three extracts was estimated by Ransom's process, as modified by Braithwaite and Umney, with the following results:—

Percentage of alkaloid in the powdered root used (by Ransom's method of assay), 1·63 per cent.

	Quantity of extract from 8 ozs. root.		Yield of extract per cent.	Calculated percentage of alkaloid in extract if no loss occurred.	Actual percentage of alkaloid in extract.	Loss of alkaloid per cent.
A	B.P. process	582 grain s.	16·6	9·82	7·18	26·8
B	Alcoholic, 413 grs.	632 grains.	18·06	9·02	7·93	12·08
	Aqueous, 219 grs.					
C	Alcoholic, 398 grs.	667 grains.	19·05	8·56	7·8	8·96
	Aqueous, 269 grs.					

2·5 grammes of the powdered extract C after treatment with 50 c.c. distilled water, left a residue of ·3 gramme undissolved.

No difficulty was experienced in percolating C in 60 powder with water, after exhaustion with spirit, and the second percolation with acid continued to remove alkaloid, even after apparent exhaustion of the marc with rectified spirit.

The process C certainly effects a considerable reduction in the loss of alkaloid, and it might, I think, be still further improved by spreading the syrupy alcoholic extract on glass plates and drying at a low temperature like a scale compound. The bulk of the alkaloid is taken up in the first percolation with spirit, and this at no time is exposed to a very high temperature, and, moreover, is very quickly dried. The powdered extract differs but slightly in appearance from the B.P. product, and has a much more decided odour of *ipecacuanha*.

The standardization of *ipecacuanha* wine will probably become authoritative in the next Pharmacopœia, and in connection with this recommendation to the Medical Council it will be noticed that the wine alone is to be standardized, a constant strength being ensured by the use of a quantity of powdered extract containing a stated amount of alkaloid. Would it not be better to fix a definite strength for the extract itself, and direct any variation from that standard to be adjusted by the addition of some harmless diluent, as sugar of milk? Acetic extract of *ipecacuanha* is a regular article of commerce, and it seems desirable, in the interests of convenience and the prevention of errors, that such a prepara-

tion should always be of the same alkaloidal strength, and be capable of being used in unvarying proportion for the production of ipecacuanha wine.

Mr. F. RANSOM said they were much indebted to Mr. Bird for this very practical paper. No doubt the present method of preparing ipecacuanha wine was far from satisfactory. Quite recently Paul and Cownley had shown how much loss of alkaloid there was in the drying of the extract, and it would be of great advantage to show, if possible, how the drying process could be avoided altogether. At any rate, this showed the necessity for a standardized preparation. Whether acetic acid was really necessary for the extraction of the alkaloid was a point hardly settled. They also required rather more information as to the characteristics and properties of emetine and cephæline. Messrs. Paul and Cownley were still doing valuable work on the subject, and they hoped soon to have an authoritative statement as to the value of these two alkaloids physiologically.

Mr. Moss said, if he remembered rightly, when Messrs. Paul and Cownley read their paper they showed that the loss of alkaloid did not take place during the actual evaporation, that a fairly dried extract just after evaporation contained about as much alkaloid as it had done previously, but that the subsequent drying to drive off the strong odour of acetic acid, and also so as to get it brittle enough to powder, caused the degeneration in alkaloids and consequent loss. Acetic acid, much too powerful, was used in making this preparation. Acetic acid during evaporation had the faculty of becoming concentrated. It did not dissipate and leave a weaker acid until a certain strength was attained, when the acetic acid helped to break down the alkaloids present in the extract. It seemed to him the present process for making the acetic extract was by no means scientific, but the reduction of acid to one-fourth, though it might be empirical, was not a very scientific suggestion. It might be that one-fourth was enough—he had not tried—and not too strong. It seemed to him they wanted more experience before deciding on what proportion of acetic acid was proper for any particular batch of ipecacuanha root.

Mr. J. C. UMNEY said he was glad to find that Mr. Bird's results confirmed those they had obtained previously as to the loss of total alkaloids in heating the acetic extract to get it brittle enough to powder. But in his last experiments the yield of alkaloid com-

pared to the theoretical yield even now showed a loss of 8 per cent., which was not so near as results he had obtained with liquid extract made with rectified spirit and other means. If he read Dr. Paul's recent paper aright, he found hydrochloric acid had no decomposing effect on the emetine. If it were necessary to use an acid for the preparation of the wine, he saw no reason why they should not use hydrochloric acid.

The PRESIDENT said it was very undesirable to submit organic products to a prolonged contact with heat if it could be avoided. If they could get a menstruum which would exhaust the drug wholly without the intervention of heat, they would obtain a preparation much more satisfactory, and less liable to the alterations which heat produced in organic products. Especially was that the case in a substance like acetic acid, which became concentrated and was finally heated with the extractives and the alkaloids. In many respects the latest form of *vinum ipecacuanha*, from the acetic extract, was an improvement on the old preparation, but no doubt most pharmacists who supplied medical men still had inquiries for the old-fashioned *vinum ipecacuanha* made by direct percolation with the wine. If they could extract the alkaloids without acetic acid, and get the whole therapeutic properties into the wine without the necessity of evaporation and re-solution, it would be decidedly better. He always thought they should avoid as far as possible too much manipulation in arriving at the solution finally used in medicine.

Mr. BIRD in reply said he did not put this process forward as perfect, for 10 per cent. loss was far from perfection; still, it was better than 30 per cent. The most perfect process was that for the liquid extract by Mr. Braithwaite and Mr. Umney, but it did not seem that people would have it, and as far as he could judge, in the new Pharmacopœia an acetic acid process would be official, and while that was so the powdered extract would be sold in preference to the liquid. At the same time the liquid preparation was the most perfect yet devised. He was pleased to see that *ipecacuanha* had become the focus of so much attention on the part of many observers, and they would probably at no distant day know as much about its chemistry as they did about that of the cinchona barks.

Mr. Bird was thanked for his valuable note.

The following communication was then read by Mr. F. Ransom:—

NOTE ON TINCTURE OF LOBELIA.

By J. F. LIVERSEEGE, F.I.C.

The British Pharmacopœia orders for each pint of tincture "Lobelia, in No. 40 powder, $2\frac{1}{2}$ ounces." I took a weighed quantity of a fair sample of the herb and attempted to reduce it to that degree of fineness, but prolonged and vigorous pounding, rubbing, etc., in a mortar failed to do so; in fact only 40 per cent. could be made to pass through a No. 40 sieve, the remainder being stems and stalks, which were flattened and split, but could not be powdered.

The British Pharmacopœia implies that the whole of the drug can and should be reduced to No. 40 powder; this may be possible for the drug grinder on the large scale, but I submit that a pharmacist cannot do it in a mortar, and will be in doubt whether he shall use $2\frac{1}{2}$ ounces of the drug powdered as finely as he can do it, or take 6 ounces of the drug and use the $2\frac{1}{2}$ ounces that will pass through the No. 40 sieve for one pint of tincture.

It appeared probable that a tincture of the powder would be decidedly more active than one made from the stalks; to test this, tinctures were made from each, by official proportions and method. The analysis of these and of three other tinctures is given below, the alkaloid being determined by Farr and Wright's method.

Source of Tincture.	Colour.	Specific Gravity.	Grammes per 100 C.c.	
			Extractive.	Alkaloid.
No. 40 powder	Dark brown	·9354	2·89	·052
Residual stalks	Brownish green	·9287	1·56	·031
Calculated for herb	—	—	2·09	·039
Farr and Wright's average (9)	—	—	2·20	·035
Wholesale tincture (A) . . .	Olive green	·9309	3·44	
" " (B) . . .	Brown	·9304	2·07	
Retail " (C) . . .	Brown	·9346	2 24	

It will be seen that the tincture from the powder contains rather more than one and a half times as much extractive and alkaloid as the tincture from the stalks.

Tincture of jaborandi is the only other leaf tincture in which

No. 40 powder is added. In the other four, belladonna, digitalis, buchu, and hyoseyamus, No. 20 powder is directed to be used.

The subject of this note is not of great importance, but I think that, for tinctures at least, the British Pharmacopœia directions should be such that the pharmacist can, with ordinary appliances, make the preparation without any doubt as to the correct course to pursue.

The PRESIDENT said this was a useful note, and the author was entitled to the thanks of the meeting. Perhaps it was not altogether such an attractive subject as opium, ipecacuanha, or cinchona, but, on the other hand, lobelia was an important drug. It was one that was largely used by a class of men called Coffinites, who might have brought it into disrepute, but there were practitioners in America who used it very largely, and also in this country, and when used with a certain amount of discretion there was not the slightest doubt that it was a very valuable drug. If an equally good tincture could be made in the way suggested, the direction should be modified so that every retail pharmacist could make his tincture without so much trouble and without having to reject a large proportion of the stem which did not pass through the sieve.

In the absence of the author the next note was read by Mr. F. Ransom:—

GLYCERIN TINCTURE OF CINCHONA.

By FREDERICK DAVIS, B.Sc.

The purport of this paper is merely to show by experimental data that a better tincture of cinchona may be prepared by using glycerin with spirit for the exhaustion of the bark than by employing spirit only.

In each sample of tincture estimated the spirit employed was as recommended by Farr and Wright, namely, 70 per cent. by volume, but in addition 10 per cent. of glycerin was employed.

I have tabulated as clearly as possible the results obtained, which speak much more forcibly than words.

The bark was in all cases estimated for total alkaloids by the B.P. process, whilst the respective tinctures obtained therefrom were estimated gravimetrically.

The bark was reduced to No. 60 powder, and each estimation was conducted three times, the resulting average being tabulated. The specific gravities of the tinctures varied from '921 to '964.

*Comparative Table of Cinchona Tincture and Glycerin
Cinchona Tincture.*

No. of Sample.	Percentage of Alkaloids in Bark.	Percentage of Alkaloids in Spirit Tincture.	Percentage of Alkaloids in Glycerin Spirit Tincture.	Percentage of Extractive from Spirit Tincture.	Percentage of Extractive from Glycerin Spirit Tincture.
I.	5.3	1.17	1.2	7.54	7.62
II.	4.7	.92	.96	5.17	5.26
III.	6.2	1.29	1.33	8.02	8.32
IV.	4.9	.93	.95	5.18	5.25
V.	5.4	1.15	1.22	7.53	7.38
VI.	5.2	1.20	1.27	6.01	6.28
VII.	5.8	1.19	1.22	7.98	6.07
VIII.	6.9	1.31	1.35	8.09	8.18
IX.	5.8	1.21	1.29	6	6.4
X.	5.6	1.18	1.17	7.32	7.30
XI.	5.9	1.21	1.25	7.52	7.55
XII.	4.8	.95	1.99	5.12	5.28

It will be observed from the foregoing that if bark of known strength in total alkaloids be employed, the results as tinctures are fairly constant, although in one or two cases a slight discrepancy may be seen, due in all probability to experimental error.

Mr. J. C. UMNEY said he did not catch the percentage. Was it 70 per cent. by volume of alcohol and in addition 10 per cent. of glycerin, or 10 per cent. of glycerin and 100 parts of alcohol?

Mr. RANSOM said it was 10 per cent. additional, as far as he could understand the paper.

Mr. J. C. UMNEY said as far as he could understand it there was practically no difference in the product, beyond the result of experimental error.

Mr. ALCOCK said the whole thing was based on what Mr. Umney said. If Mr. Davis added glycerin after he made his tincture they would come out precisely the same, so that the glycerin did not influence the result at all.

Mr. MOSS said of all the tinctures of the British Pharmacopœia the one which formed the subject of this note was one which required most of all to be standardized after it was made. According to his experiments on cinchona bark he found different

barks treated with the same menstruum gave very different results dependent upon the nature of the bark. They might each of them contain 5 per cent. of alkaloids, but they did not all give up the same proportion of alkaloids to the solvent. The alkaloids appeared to be in some cases in different forms of combination which the solvent action of the spirit was unable to break up. Mr. Davis had in nearly every instance got out about the same proportion of alkaloids. In some instances, if he heard correctly, the proportion of alkaloids got from the bark was greater than that contained in the bark. He did not find any such result in any of his experiments, and should be glad to know how it arose. It was possible that some misunderstanding or error had crept into the paper, and that Mr. Davis would be able to explain it after his attention had been drawn to the matter.

Mr. BIRD thought it was proposed in the new Pharmacopœia to standardize tincture of cinchona in regard to alkaloidal contents, and also the compound tincture.

The PRESIDENT said they were indebted to Mr. Davis for the note, but there appeared to be a discrepancy, as Mr. Moss pointed out, and it was possible that arose from the note being so brief, and not containing all the information with regard to the tincture that was desirable. Perhaps the author might rectify that deficiency. When he saw it on the agenda he thought that it might have dealt with the use of glycerin in tinctures. They knew that glycerin was a very valuable substance, but personally he did not care to introduce it into any solution unnecessarily—especially in any preparations that had to be assayed or standardized afterwards.

Mr. Davis was thanked for his note, which brought the discussion of the papers to a close.

In reply to the above criticism the author communicated to the *Pharmaceutical Journal* the following explanatory remark:—

“ It will be observed the strength of the tinctures operated upon is not mentioned. This is a grave omission upon my part, but I may now state in all cases a valoid preparation of the bark was made, and five fluid ounces of this preparation considered as equivalent to a pint of tincture, that is of the same strength as if a pint of tincture had been obtained from five ounces of the bark; hence it will be seen by referring to the first three columns of my comparative table that in some cases about 90 per cent. of the alkaloids contained in the barks were present

in the resulting tinctures. It is apparent, also, a better tincture results from the use of glycerin and spirit, although the actual difference is not large. I have to thank Mr. Ransom for pointing out the apparent error by telegram prior to the meeting. The time, however, was too short to explain satisfactorily before the paper was read."

GENERAL BUSINESS.

The Formulary Committee.

Mr. J. C. UMNEY proposed the re-election of the Formulary Committee, Messrs. Martindale, Naylor, Abraham, Greenish, Groves, Maben, Martin, Ransom, Reynolds, Symes, and Wright. He did so with all the more pleasure on account of what they had heard from the President of the Pharmaceutical Society that morning, as to the manner in which the work of the Committee was appreciated by the Medical Council.

Mr. BIRD seconded the motion, which was carried unanimously.

Mr. T. B. GROVES, on behalf of the Committee, returned thanks for their re-election, saying he could not promise to do as much work personally as he had in former years, but if it was desired that his name should be retained, he would do what he could.

The PRESIDENT said the work of this Committee might not be so important this year, the British Pharmacopœia being under revision, but it was just as well that the Committee should remain in existence, although it might not do much active work for a year or so.

Presentation from the Bell and Hills' Fund.

The PRESIDENT said one of the most pleasing duties which fell to the lot of a President of the Conference was that of presenting to the local association of the town where the meeting was held a few books in commemoration of the visit. In the present case, as usual, they had consulted the Local Committee as to the books they would like, and it was found that they were not only up to date, but even wanted some books which were still in the press, so that the presentation at the present moment was not quite complete. They had chosen Thorpe's *Dictionary of Chemistry*, and Kerner and Oliver's *Natural History of Plants*. The latter was coming out in parts, and they could only therefore present the first volumes at present; but the others would be added when

ready. To these were added the *Science Papers* and *Pharmacographia*, contributed by Mr. Thomas Hanbury in memory of his brother, Daniel Hanbury. He had much pleasure in making the presentation to Mr. Bridge, the Chairman of the Local Committee.

Mr. BRIDGE said it was a great pleasure to him to receive these books, but he must say that the credit of the selection was due to the local secretary, Mr. Hardwick. Although they had a local society, of which he was proud to be President, he was sorry to say that they had no home of their own, and arrangements had been made for placing them in the public library, under the care of the librarian. The Town Council had been kind enough to undertake the charge of them under the following conditions:— They would be placed in the Reference Library, where they could be consulted by any of the public, but could only be borrowed by their own members, and the right was reserved to remove them, if at some future time they had a room of their own in which to keep them.

Mr. HARDWICK assured the Conference that these books would be largely read by the local members, who were looking forward to deriving much profit from their use.

Mr. SCHACHT said he hoped the local association would soon have a home of its own in which to place the books. The Bristol Association, being in similar circumstances, deposited the books in a public library in Bristol, with regulations such as Mr. Bridge had mentioned, and unfortunately the public were not as careful as they might be; some of the books were injured, and some entirely lost. He should have been glad to hear that these books would have been left in the care of the President or one of the members of the local society.

Mr. BRIDGE said the Committee would make a note of Mr. Schacht's remarks, and consider the suggestion he had thrown out.

Place of Meeting for 1896.

Dr. SYMES, in the name of the chemists of Liverpool and Birkenhead, invited the Conference to meet in Liverpool next year. It was now twenty-five years since they met in Liverpool, and he regretted to say that a great many who were then active members, both residents and visitors, had passed away; but there were many still left, and if the Conference were good enough to accept the invitation he was instructed to offer, they would do their best

to make the meeting a successful one. He need not enlarge on the advantages of Liverpool; it was the second city in the Empire; with miles of docks, immense numbers of ships, and many modern improvements, such as an elevated electric railway, and the Mersey tunnel, and streets and warehouses of immense extent containing produce from all parts of the world; all which matters would be of interest to intellectual men such as attended the Conference. A good committee had been appointed, and no effort would be spared to carry out the arrangements satisfactorily.

Mr. J. SMITH supported the invitation. The chemists in Liverpool were very sensible of the splendid work which was being done by the Conference, and felt it was only their duty to offer such hospitality as they could to the Conference, and to do all they could to strengthen it and extend its influence. There were in Liverpool two very flourishing societies, the Liverpool Chemists' Association, one of the oldest in the country, and the Liverpool Pharmaceutical Students' Society, and in the officers of those societies they had the machinery for making the visit a successful one. There were other attractions besides the docks and shipping. Liverpool was on the high road to Scotland, North Wales, Ireland, and other places, and many he hoped would find it very convenient to take the Conference on their way to a further holiday.

Mr. T. B. GROVES, who said he had a lively recollection of the first visit to Liverpool, under the presidency of his friend, Mr. Stoddart, and should be glad to repeat his visit there, moved that the Conference accept with many thanks the invitation from Liverpool.

Mr. G. C. DRUCE had much pleasure in seconding the motion. He had never seen Liverpool and feared he never should see it, except under some such circumstances as a visit of the British Pharmaceutical Conference, or possibly on the route to a transatlantic journey. He was told there was an excellent atmosphere there, compared with Manchester; and that it was considered a very pleasant place by those who knew Oldham; but be that as it may, he was looking forward with great anxiety to visit it. They who lived in Oxford were supposed to be rather reactionary in their tendencies; Bournemouth was a place where they toiled not, neither did they spin; in Liverpool they would come in closer contact with more active minds, and perhaps more democratic tendencies. At any rate, if it were true that the Conference was not quite so active as it might be, and not so fully representative, no doubt coming in contact with the second city of the king-

dom would certainly enlarge their numbers, and probably increase their mental activity.

The PRESIDENT, in putting the resolution, said he should strongly support it as the last act of his official life, and it was immediately carried by acclamation.

Dr. SYMES thanked the Conference for so cordially accepting the invitation, which he said would strengthen the hands of the Committee in making the arrangements.

ELECTION OF OFFICERS.

The PRESIDENT having explained that it was open to any one to expunge any name from the list suggested by the Committee or substitute any other, ballot papers were handed round, and Mr. Robertson and Mr. Basker were nominated as scrutineers.

After a short interval they announced that the following had been unanimously elected:—

President.—W. Martindale, F.C.S., London.

Vice-Presidents.—Michael Carteighe, F.I.C., F.C.S., London; J. Laidlaw Ewing, Edinburgh; W. Hayes, Dublin; M. Conroy, F.C.S., Liverpool.

Treasurer.—John Moss, F.I.C., F.C.S., London.

Honorary General Secretaries.—W. A. H. Naylor, F.I.C., F.C.S., London; F. Ransom, F.C.S., Hitchin.

Honorary Local Secretary.—T. H. Wardleworth, Liverpool.

Other Members of the Executive Committee.—F. C. J. Bird, London; E. H. Farr, Uckfield; E. M. Holmes, F.L.S., London; Stewart Hardwick, Bournemouth; W. F. Wells, Dublin; Edmund White, B.Sc., London; R. Wright, F.C.S., Buxton; George Coull, B.Sc., Leith; J. Smith, Liverpool.

Auditors.—F. Spinney, Bournemouth; A. S. Buck, Liverpool.

VOTES OF THANKS.

Mr. LAIDLAW EWING moved,—

“That the hearty thanks of the meeting be given to the manager of the Mont Dore Hotel for the use of the hotel in connection with the holding of the garden party and the reception by the President of the British Pharmaceutical Conference.”

They must all congratulate the Local Committee on having obtained such beautiful headquarters, and the use of the large hall

and gardens had tended very much to the comfort and enjoyment of the members of the Conference.

Mr. COLLIER seconded the motion, which was carried unanimously.

Mr. S. R. ATKINS moved,—

“That the warmest thanks of the visiting members of the Conference be given to the Local Committee, and especially to Mr. Bridge, the Chairman; Mr. Hardwick, the Local Secretary; and to Messrs. Bilson, Toone, and Williams for the very successful manner in which the various arrangements connected with the Bournemouth visit had been carried out.”

He said he was very happy to have the privilege of moving this resolution. Up to date the meeting had been a most successful one; and now that the business portion was over it was only fitting to pass such a resolution, though he was not unmindful of the fact that there were other favours yet to come. The meeting had been in every respect a marked success, and to secure that result at least two things were essential. There must have been careful forethought as to what was required, and secondly, the most careful attention to details. He felt partly pleased, as a resident in the southern district, that the meeting was held in Bournemouth. It was not possible for a small place like Salisbury to entertain such an august assembly, but when it came so near, they felt as though they had a share in it. It was a most charming locality, with diversified scenery, and he had watched the growth of Bournemouth from year to year with great interest and pleasure, for it might almost be compared with Chicago; and at last he was quite amazed to see what it had become. They found elegant pharmacy of the true type flourishing here, and it was an additional source of gratification. In conclusion he desired on behalf of the ladies to express their sense of obligation to the ladies of Bournemouth for what they had done to make them welcome.

Mr. MATHEWS seconded the motion.

The PRESIDENT, in putting it, said he thought Mr. Atkins had for once in his life made a mistake in comparing Bournemouth to Chicago, for anything more unlike he could hardly conceive. He had attended several meetings of the Conference, and had acted on Reception Committees, but he had never known a case in which all the arrangements were so perfect.

The motion was carried by acclamation.

Mr. HARDWICK said he felt it a proud moment to stand there and acknowledge this vote of thanks on behalf of the chemists of Bournemouth, for they had all helped, and even some gentlemen outside the immediate district. They all knew how Mr. Bridge, the Chairman, had worked, and the musical programme was entirely his doing. To Mr. Bilson and Mr. Williams were due chiefly the arrangements for the excursion on the morrow, which he hoped would be thoroughly enjoyed. Messrs. Endle and Jones had constantly given advice, and, in fact, every one had helped in one way or other. He should like to borrow the words used the other day by Sir Henry Irving, when he said that the greatest honour that a man could receive was the appreciation of his comrades and fellow-workers, and with that feeling he thanked them most heartily for this vote. Before sitting down he should like, though the regular business was over, to place on record an original observation which he had made, and which, he had no doubt, other local secretaries had made in times past, though they had not published it. He had discovered that if any one wanted to thoroughly enjoy a Conference meeting he should first of all plan to get the Conference invited to his own town, and then get himself nominated local secretary.

Mr. J. A. TOONE also responded. He was glad that Mr. Hardwick had mentioned other names, because those mentioned in the resolution really only represented the rest; they had all worked hard together since last autumn, more or less, and their meeting together had been very pleasant, and conduced very greatly to good-fellowship. There was only one danger which some of them apprehended, which he might as well mention. Some two or three years ago they had a meeting of the British Medical Association there, which they much enjoyed, but in the course of a few weeks or months afterwards some twenty or thirty new doctors set up in practice, and there was a vague idea that if the Conference came there they might shortly afterwards be inundated by pharmacists from other parts of the country. He should like, therefore, to correct any false impression any one might have about Bournemouth. It was a very nice place to live in, but it was only a poet's dream to speak of it as an El Dorado or anything of that sort.

Mr. BILSON and Mr. WILLIAMS also responded briefly.

Mr. W. MARTINDALE, after apologising for his absence during the Conference sitting, owing to his presence being required in

London in connection with the meeting of the British Medical Association, then thanked the members for the honour they had conferred upon him in electing him as President for the ensuing year. He felt some diffidence in accepting the post, for he found the stress and worry of business life rather tended to exhaust one's energies, but he would promise to do his best.

Mr. CARTEIGHE said he had to propose a vote of thanks to a gentleman whose name he was sure would be received with acclamation on this occasion, although they might have some little reckonings to go through with him in private. This gentleman was a great success in the capacity of chief; he was not only gifted with abilities of the highest order, but with a good deal of enthusiasm, and was overflowing with energy. He did not remember any meeting of the Conference where the interest and enthusiasm were so well sustained as during the last two meetings by the President, Mr. Martin; and the resolution he had to move was that,—

“The heartiest thanks of the Conference be accorded to the President for the ability and enthusiasm with which he has discharged the duties of his office and conducted the business of this meeting.”

The duties of the President were not confined to presiding at the public meetings, and he knew from personal association with Mr. Martin during the last two years how he had devoted himself to the business of the Conference, sparing no pains and denying himself much in order to be present at all the meetings of the Conference, and to throw himself heart and soul into the interest of the body he represented. He desired to thank him most heartily for the success which had crowned his efforts, and he hoped his experience in presiding over his *confrères* might tend to increase his feelings of regard and affection for them, of which they had sometimes felt a little doubt.

Mr. JOHN MOSS seconded the motion with great pleasure, Mr. Martin being about his oldest friend in connection with pharmacy. They came to know each other many years ago, when they attended the same lectures, sat on the same bench, read the same books, and compared notes with each other. In these days they looked on the position of President either of the Pharmaceutical Society or the Conference with some reverence and a good deal of awe. He now saw Mr. Martin in that honoured position, and though he did not regard him with reverence or awe, that feeling

had given place to one which was more satisfying to the man who held it, and more gratifying to him who inspired it. With regard to the resolution, he would only ask them to remember how the meetings had been conducted, how the President had made a few suggestive comments on each paper, directing the discussions, and eliciting the best results from the various papers brought before them, so that he might truly say that Mr. Martin had been not only a good but a brilliant President.

The motion was put by Mr. CARTEIGHE, and carried by acclamation.

The PRESIDENT, in reply, said when he was first invited to become President he had great misgivings as to whether he could properly fulfil the duties, but the invitation reached him in Chicago, and he was so inspired by what he saw around him there that he—perhaps unwisely—accepted, and for the next twelve months existed in a state of constant trepidation. Then came the meeting at Oxford, and in that ancient seat of learning he was able, with the assistance of the past presidents and the general secretaries, to whom they owed so much, to get through the duties, and again felt rather elated, on being re-elected for a second year, at the prospect of presiding over the Bournemouth meeting. Again, however, there came a fall in the barometer, and his feeling of trepidation was twice as bad as the year before. Still, he had done his best, and though he had no doubt committed many errors of judgment, and his best had not been as good as the Conference deserved, he had allowed nothing to interfere with his doing all he could to promote the welfare of the Conference and the good of pharmacy. Mr. Carteighe had alluded to some reckonings to come, and he could only say that on the square and in the open he was not afraid of them at any time or any where. He was quite aware that he had said things, and could say things, and if he lived, should say things which were strong; but they were the earnest conviction of his life, and they had been and would be said only after due consideration, and because he felt it to be his duty to say them. He thanked all who had contributed papers, and every member who had so heartily and kindly supported him, with all his shortcomings, in the chair.

Mr. G. F. SCHACHT then proposed a vote of thanks to the two hon. general secretaries, on whose labours the interest of the Conference so largely depended. It was not always easy to secure good and suitable papers for the meetings, and these gentlemen must be credited with qualities of a very special order, in that

they had been able for so many years to gather together so many papers of such value. He would therefore move,—

“That the best thanks of the Conference are due and are hereby tendered to Messrs. Naylor and Ransom for their unwearied efforts to promote the success of the Conference and their invaluable services as hon. secretaries for the past and many previous years.”

Mr. MARTINDALE, in seconding the resolution, said he had had some experience of the work of both these gentlemen, having been both Treasurer and President, and without their aid he did not know how he should have got on; indeed, without their help he should look forward to the coming year with a great deal of alarm.

The resolution having been carried by acclamation,

Mr. W. A. H. NAYLOR said he felt almost overwhelmed by this vote of thanks, but it was all the more welcome because he had felt a little doubt whether, owing to the papers being less numerous than usual, a vote of want of confidence in them might not be passed. He could assure them that any labour he undertook for the Conference was a source of a great personal pleasure; it was his desire to see the Conference grow and prosper, and he would especially thank those who had responded to his and Mr. Ransom's appeals and provided papers for the meeting. He felt sure they had only to make similar appeals for next year to receive the same cordial response.

Mr. F. RANSOM, in responding, said the members of the Executive Committee were all entitled to a share of the vote of thanks, and also the local Executive.

The proceedings then terminated.

EXCURSION TO THE NEW FOREST.

Probably for years to come, Thursday, August 1st, 1895, will be remembered with pleasure by those who took part in the excursion through the New Forest. The success of an expedition of this kind depends chiefly on the care and forethought of those responsible for the arrangements, and certainly no pains have been spared on the part of the Bournemouth local committee in this respect. Members and their friends, to the number of 145, left the Mont Dore Hotel at 9.45 a.m. in about a dozen coaches and char-a-bancs, and, following the Christchurch road, arrived

before long at the picturesque old town of that name. The fine old Norman Abbey was admired from the road, and time was found to stop for a few minutes to watch some troopers of the Royal Artillery practising tent-pegging. After leaving Christchurch the Forest was soon reached, and the smithy was pointed out where the alleged assassin of William II. was said to have had his horse's shoes reversed, after the murder. The curious, little, old-time inn known as the *Cat and Fiddle* was next reached, where refreshment was obtained for horse and man. After leaving, Holmesby, Boldre Wood and Mark Ash followed in quick succession, and at about a mile from Lyndhurst the marquee, where luncheon was to be served, was seen through the trees. Here the coaches were deserted and a capital luncheon was enjoyed, after which the following toasts were drunk:—The "Local Committee," proposed by Mr. Martin, seconded by Mr. S. R. Atkins, and replied to by Messrs. Bridge, Hardwick, Toone and Bilston; "The Conference," proposed by Mr. Bridge, seconded by Dr. Symes, and replied to by Mr. Martindale. Mr. Bridge proposed, Mr. Martin seconded the toast of "The Ladies," which was replied to by Mr. Druce.

The toast of the health of Mr. and Mrs. Martin and family, submitted by Mr. Carteighe, was received with the greatest enthusiasm.

Then followed a delightful stroll to Lyndhurst, known as the capital of the Forest. The old Court House was inspected, and in the church the famous frescoes by Sir Frederic Leighton, P.R.S., depicting the parable of the Ten Virgins, were much admired.

As soon as the coaches were ready a start was again made, and the drive was continued through the most beautiful scenery of the heart of the Forest to Emery Down, where preparations for the Autumn Manœuvres were noticed. Ringwood was reached in about an hour, and here tea was provided at the hotel. At about 6.30 the party was once more on its way to Bournemouth, and the drive through the Avon Valley in the fresh evening air was much enjoyed. A short halt was made at Christchurch to water the horses, and it was with many a matter of regret that there only remained three more miles of the journey. Rain commenced to fall lightly during the last two miles, but was too late to spoil the pleasure of the day spent amidst the loveliest of English sylvan scenery. Bournemouth was reached about 8.15, after what may perhaps be considered the most picturesque and charming of the annual excursions of the British Pharmaceutical Conference.

RECEPTION AND CONVERSAZIONE.

The reception by the President, **N. H. Martin, Esq.**, was held at 8.30 on Monday evening in the Winter Garden at the Hotel Mont Dore.

The guests, including a large number of members and their friends, were received by the President, who was accompanied by Mrs. and Miss Martin and supported by members of the local and general executives.

A very superior programme of music had been arranged, at which several members of the local committee rendered valuable assistance. The songs by Madame Newling and the violin solos by Mr. Charles Fletcher were also greatly appreciated. In an adjoining room an excellent series of microscopic objects was exhibited under the direction of Mr. F. Tanner.

The programme was concluded with an impromptu dance, an innovation which was heartily enjoyed by the company.

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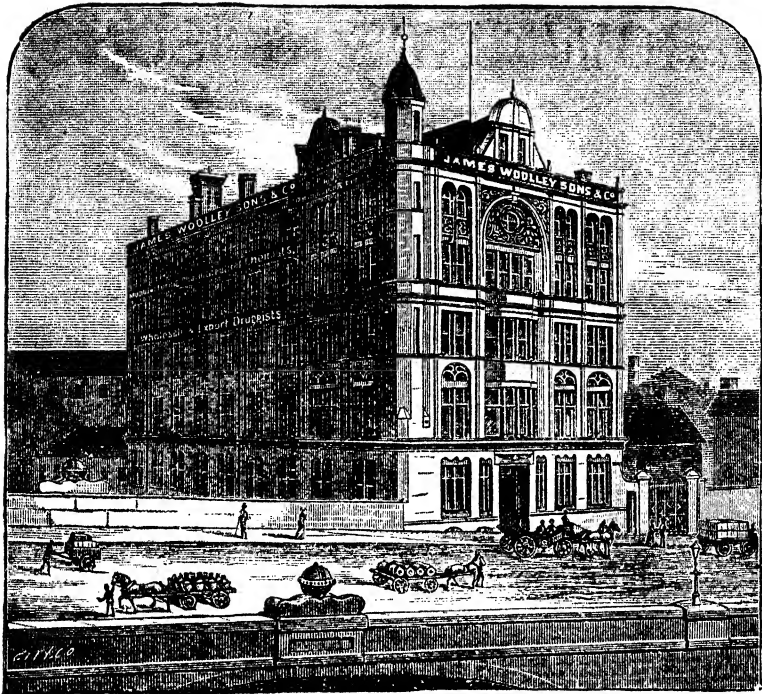
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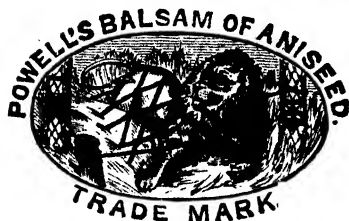
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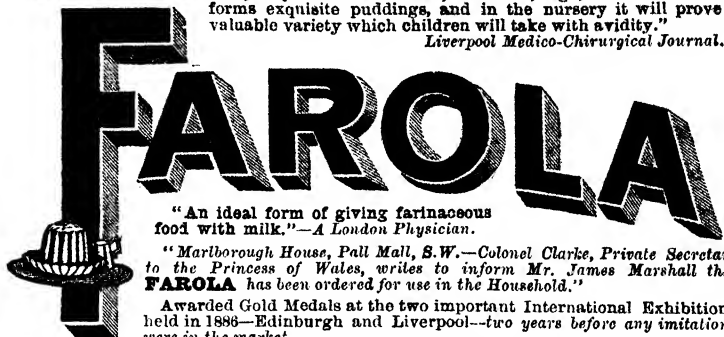
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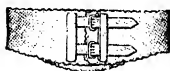
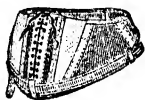
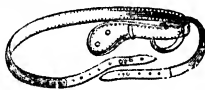
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Such being our present position in this Branch of Manufacture, we beg to assure our friends and customers that no effort or capital will be spared to hold our position and merit their continued support and approval.

We beg especially to call the attention of our customers to several new patterns of Tooth Brushes now appearing in the new edition of our catalogue, as patterns never yet made by any other manufacturer, and some of which, we think, will command a good sale. We would also note that our Anticarious patterns, specially, A, B, C, D, which were registered by us for the 1851 Exhibition, now 41 years ago, are still popular patterns, and sell well, being most effective in cleansing between the teeth without irritating the edges of the gums.

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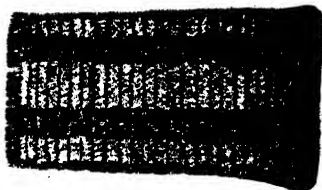
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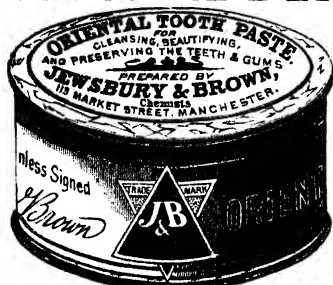
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The Apollinaris Company, Limited, beg to intimate that it may not be to the interest of the Trade to enter into arrangements with others which might deprive them of the advantages which the Company will endeavour to secure to those Houses who favour them with orders for Natural Hungarian Aperient Water.

THE APOLLINARIS COMPANY,
Limited,

4, Stratford Place, Oxford Street, London, W.

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